# Request Request Request Request Request Request

PCI-SIG ENGINEERING CHANGE REQUEST

| | |
|---|---|
| **TITLE:** | x4 Drawing ECR Rev1.34 |
| **DATE:** | March 23, 2018 |
| **AFFECTED DOCUMENT:** | OCuLink 1.0 |
| **SPONSOR:** | Ed Poh (Molex), Alex Haser (Molex), Jay Neer (Molex) |

## Part I:

### 1. Summary of the Functional Changes

The drawings included in OCuLink ~~1.0~~ showed SMT hold downs on the fixed side. For durability, the industry prefers through-hole hold downs. This ECR replaces the drawings with ones that show the preferred board-attach. Hold-down features and footprints have been removed from the normative part of this Specification (~~examples are to be included in a separate appendix ECR~~). Additionally, several dimensions and tolerances have been corrected based on input from workgroup members.

### 2. Benefits as a Result of the Changes

The OCuLink ~~1.0~~ specification now shows drawings for parts preferred by the industry. Updated dimensions and tolerances ensure intermateability between components made by different manufacturers. Users are able to choose their preferred board-attach method.

### 3. Assessment of the Impact

Drawings and dimensions for the x4 form factor have been corrected and clarified.

### 4. Analysis of the Hardware Implications

Updating the dimensions and tolerances as well as clarifying figures will enable more effective manufacturing of the components and assemblies.

### 5. Analysis of the Software Implications

None, this change does not affect software.

## Part II:

Content shown on subsequent, odd-numbered pages contain the changes dictated by this ECR. Sections of text, figures and tables that have not been included are unaffected by this ECR.

# Request Request Request Request Request Request

*Editor's Note: This document is intended to be viewed showing two pages side-by-side. The original drawings from OCuLink 1.0 are on the odd numbered pages (left). The new drawings are on the even numbered pages (right).*

# 4. x4 Fixed Host Board-side Connectors

- The x4 Fixed Host Board-side Connectors (see Figure 4-1 and Figure 4-5) are 42-contact SMT connectors with metal shells for robustness and for latching and are used for both external and internal applications.
- The x4 Free Cable connector, defined in Chapter 5 of this Specification, mates to the two Host Board-side connectors, defined in this section.
- The connectors accept both active and passive cable latching solutions, defined in Chapter 6 of this Specification.
- The connector shells are attached to the Fixed boards, by either intrusive reflow or SMT.

## 4.1. x4 Fixed Host Board-side Vertical Connector

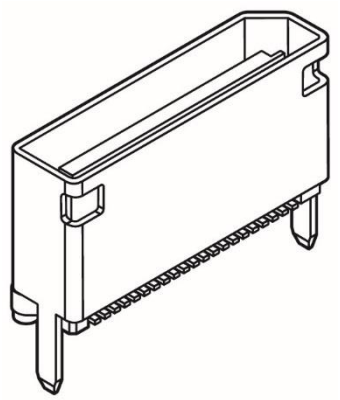


**Figure 4-1. Isometric View of the x4 Fixed Host Board-side Vertical Connector**

4

# 4. x4 Fixed Host Board-side Connectors

The x4 fixed host board-side connector are available in vertical (see Figure 4-1) and right-angle (see Figure 4-6) configurations. Both configurations:

- Contain 42 SMT circuits enclosed in a metal shell, which provide robustness and latch points for mating with free cable assemblies. These shells are attached to fixed boards either by intrusive reflow or SMT.
- Conform to their respective form factors defined in this Chapter.
- May be used in both internal and external applications.
- Mate to the x4 free cable-side connector, defined in Chapter 5 of this Specification.
- Accept both active and passive cable latching solutions, which are defined in Chapter 6 of this Specification.
- Follow the pin assignments and contact sequencing defined in Tables 3-1, 3-2 and 3-3.

*[EDITORS NOTE: Some of these bullet points were moved from Chapter 6.]*

## 4.1. x4 Fixed Host Board-side Vertical Connector

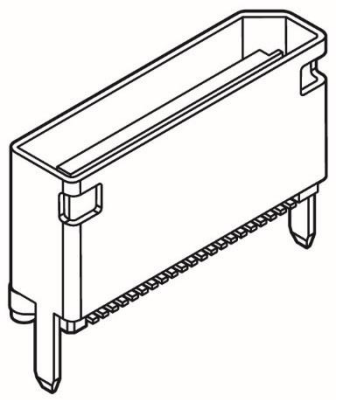


**Figure 4-1. x4 Fixed Host Board-side Vertical Connector**

## 4.2. x4 Fixed Host Board-side Vertical Connector

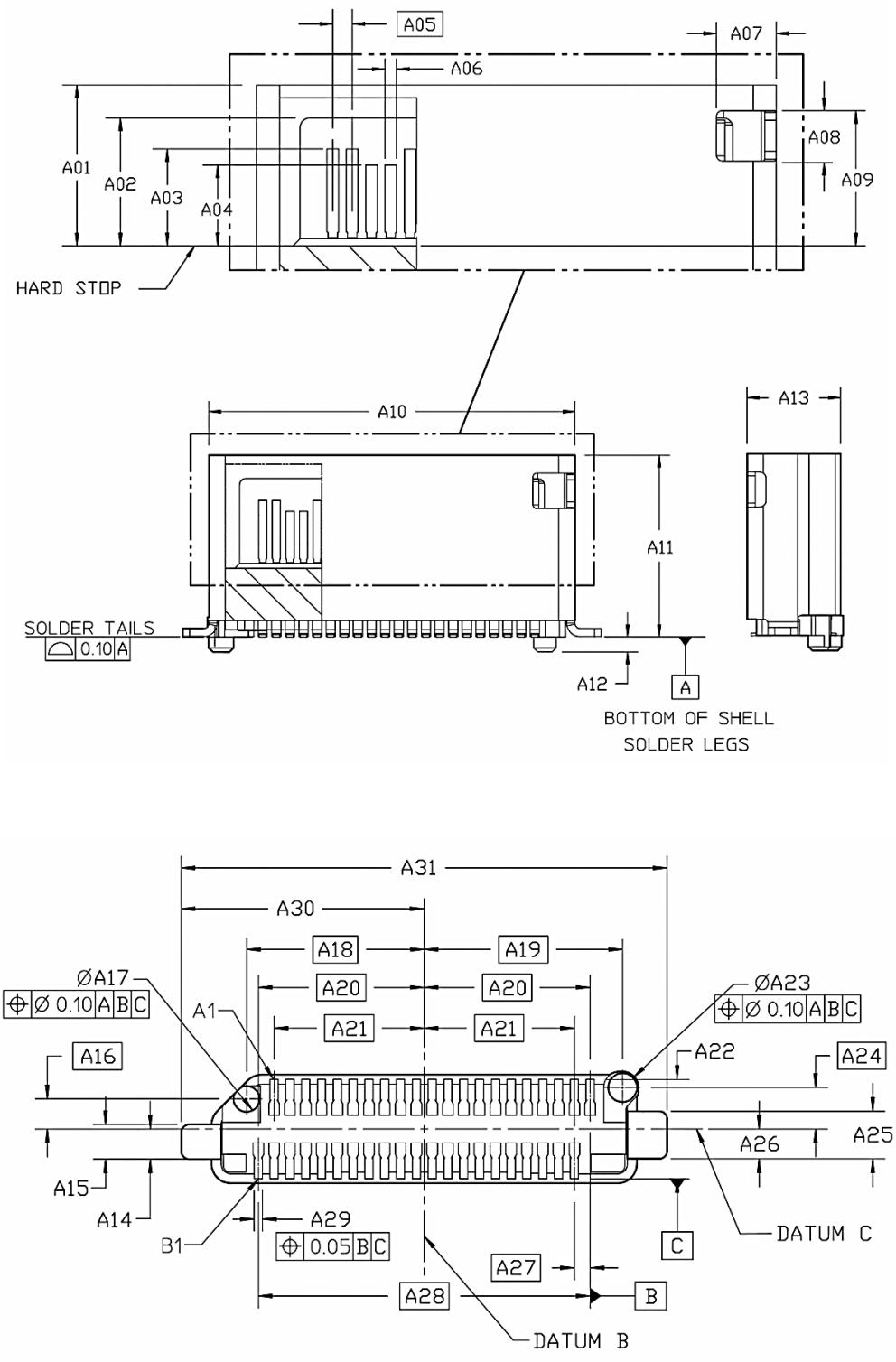



**Figure 4-2. x4 Fixed Host Board-side Vertical Connector Form Factor Dimensions**

# Request Request Request Request Request Request

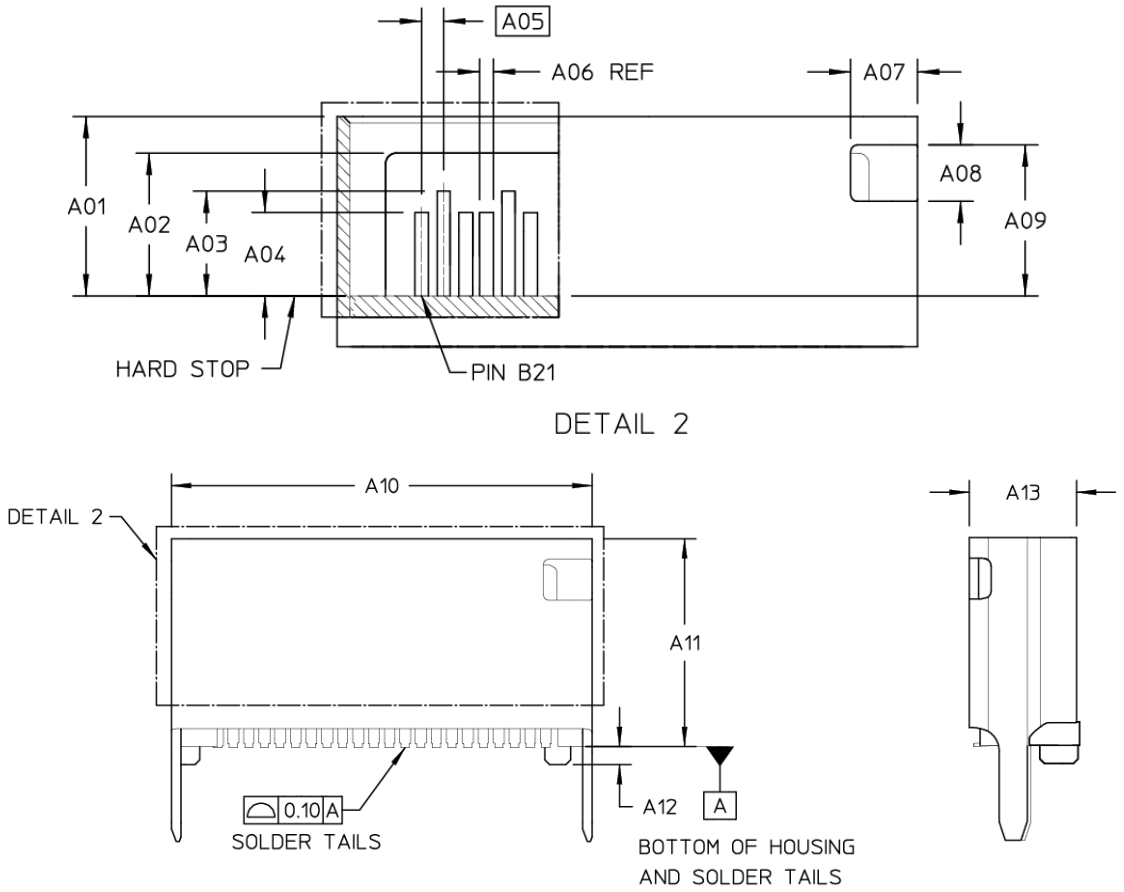



**Figure 4-2. x4 Fixed Host Board-side Vertical Form Factor**

**Note:** Refer to Chapter 3 for connector pinouts and contact sequencing. Additional features such as chamfers and flilets may be added as desired so long as they do not prevent free cable-side connectors from contacting the surface denoted "hard stop" when mated. To ensure intermateability, designers must assume no additional lead-in features are included on the free cable-side connector.

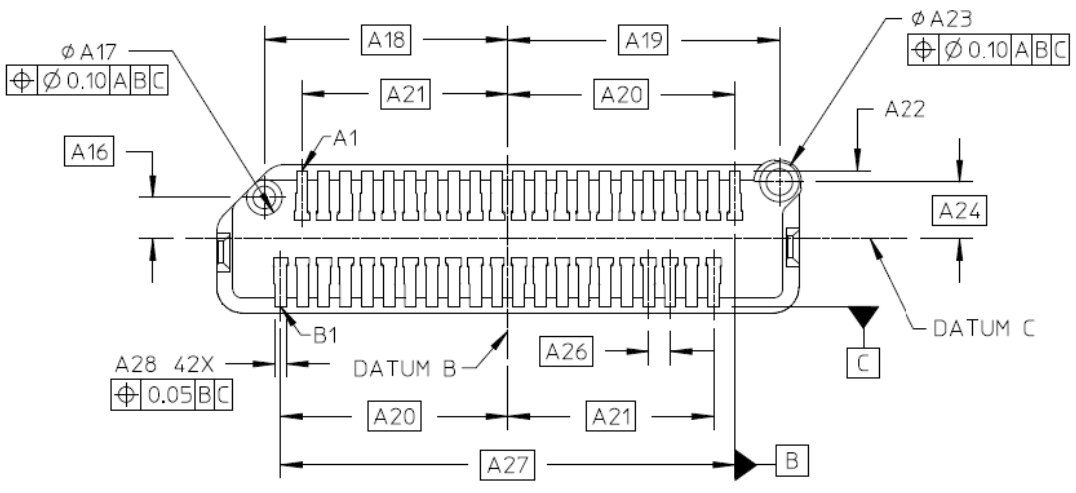



**Figure 4-3. Bottom View of x4 Fixed Host Board-side Vertical Form Factor**

# Request Request Request Request Request Request

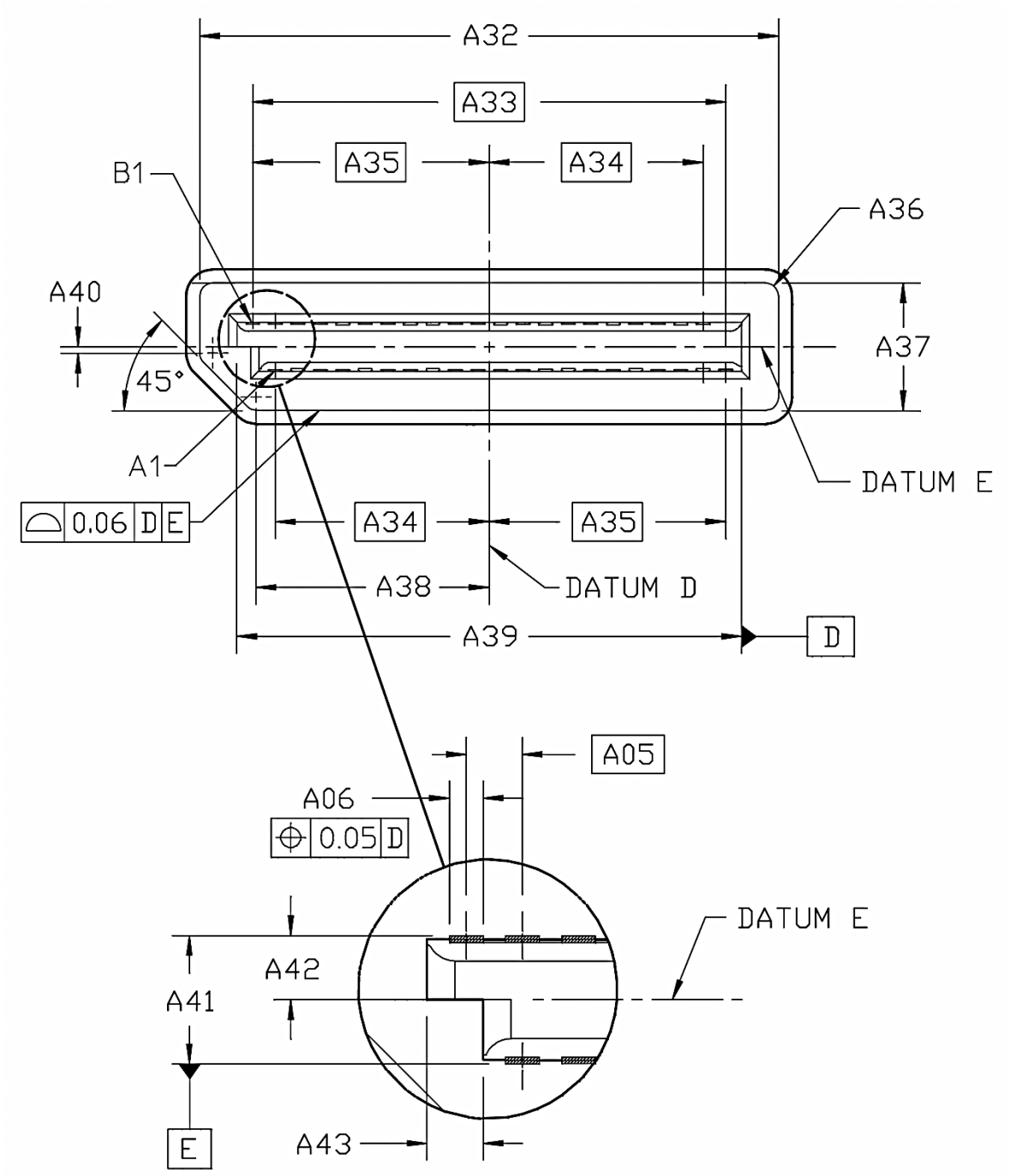



**Figure 4-3. Mating Interface Dimensions for all x4 Fixed Host Board-side Connectors**

# Request Request Request Request Request Request

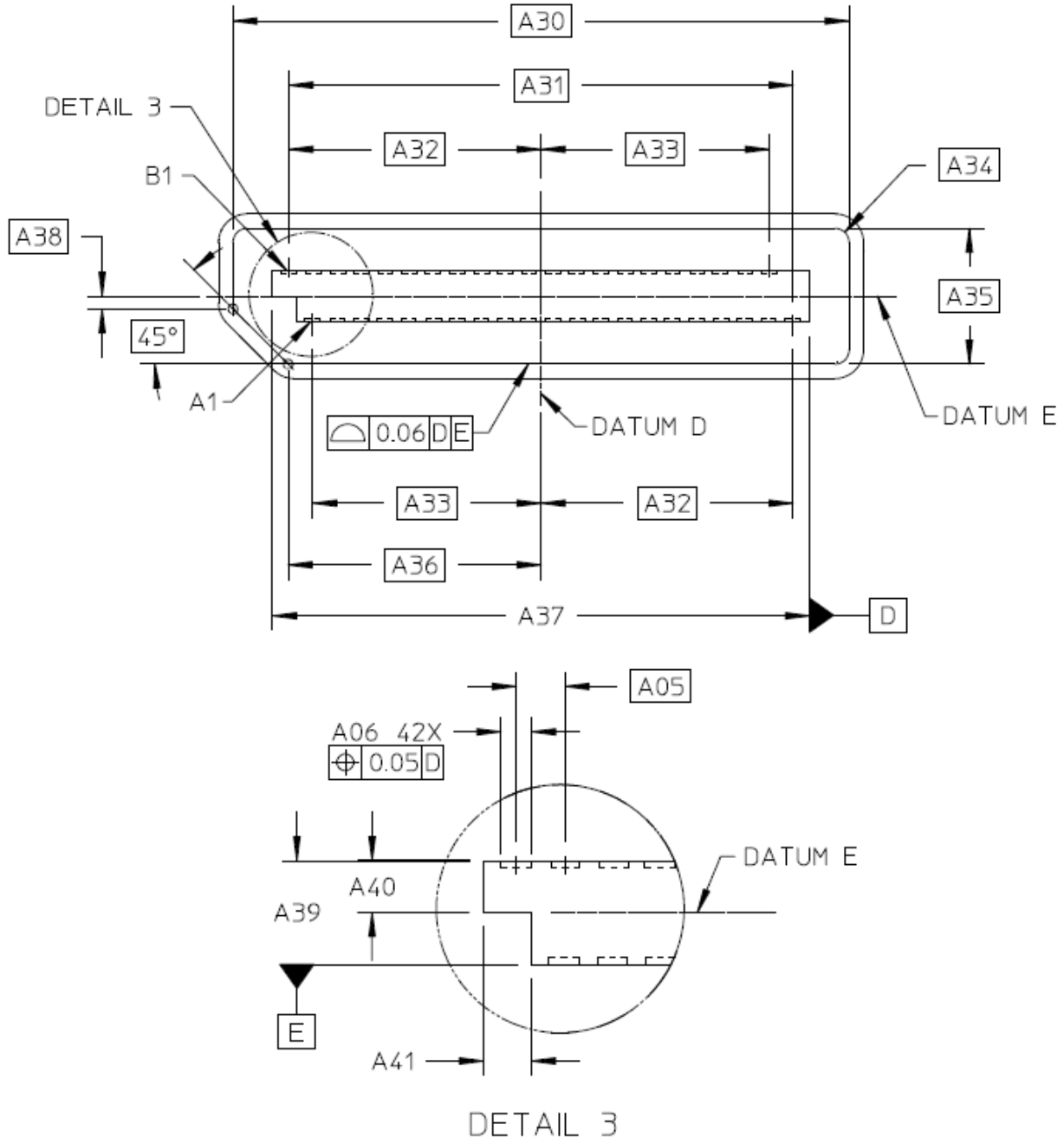



**Figure 4-4. x4 Fixed Host Board-side Form Factor Mating Interface**

**Note:** This mating interface applies to all x4 fixed host board-side connectors.

# Request Request Request Request Request Request

## Table 4-1. x4 Fixed Host Board-side Vertical Connector Dimensions

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| **Figure 4-2** | | | |
| A01 | Hard stop to front of shell | 4.15 | 0.08 |
| A02 | Hard stop to interface paddle nose | 3.30 | 0.03 |
| A03 | Hard stop to 1st mate contacts | 2.42 | 0.12 |
| A04 | Hard stop to 2nd mate contacts | 1.95 | 0.12 |
| A05 | Fixed connector contact beam pitch - Typical | 0.50 | Basic |
| A06 | Fixed connector contact width - Typical | 0.30 | 0.03 |
| A07 | Latch window width (2X) | 1.55 | 0.08 |
| A08 | Latch window length (2X) | 1.30 | 0.08 |
| A09 | Hard stop (housing) to latch point (shell) (2x) | 3.49 | 0.11 |
| A10 | Connector (shell) overall length | 13.45 | Ref |
| A11 | Connector (shell) overall height from bottom of shell solder legs (Datum A) | 6.66 | 0.08 |
| A12 | Locating peg length (2X) | 0.56 | 0.10 |
| A13 | Connector (shell) overall width | 3.43 | Ref |
| A14 | Horizontal centerline (CL) of solder tail array (Datum C) to edge of small (left) solder leg of shell | 0.95 | 0.19 |
| A15 | Small (left) solder leg (shell) width | 1.09 | 0.10 |
| A16 | Horizontal CL of solder tail array (Datum C) to CL of inboard (left) locating peg (orientation feature end) | 0.95 | Basic |
| A17 | Small (left) locating peg diameter | 0.82 | +0.03/- 0.15 |
| A18 | Vertical CL of solder tail array (Datum B) to CL of inboard (left) locating peg | 5.62 | Basic |
| A19 | Vertical CL of solder tail array (Datum B) to CL of outboard (right) locating peg | 6.28 | Basic |
| A20 | Vertical CL of solder tail array (Datum B) to CL of outside solder tails (long offset from Datum B) (2X) | 5.25 | Basic |
| A21 | Vertical CL of solder tail array (Datum B) to CL of inside solder tails (short offset from Datum B) (2X) | 4.75 | Basic |
| A22 | Edge of Row A solder tail contacts to edge of Row B Solder Tail Contacts. (Datum C) | 3.14 | 0.16 |
| A23 | Large (right) locating peg diameter | 0.97 | +0.03/-0.15 |
| A24 | Horizontal CL of Solder Tail Array (Datum C) to CL of outboard/ large locating peg | 1.31 | Basic |
| A25 | Large Solder Leg (Shell) width | 1.50 | 0.10 |

# Request Request Request Request Request Request

## Table 4-1. Dimensions for x4 Fixed Host Board-side Vertical Form Factors

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| A01 | Hard stop to front of shell | 4.15 | 0.08 |
| A02 | Hard stop to interface paddle nose | 3.30 | 0.03 |
| A03 | Hard stop to 1st mate contacts | 2.42 | 0.12 |
| A04 | Hard stop to 2nd mate contacts | **2.00** | 0.12 |
| A05 | Fixed connector contact beam pitch - Typical | 0.50 | Basic |
| A06 | Fixed connector contact width - Typical | 0.30 | **Ref** |
| A07 | Latch window width (2X) | 1.55 | 0.08 |
| A08 | Latch window length (2X) | 1.30 | 0.08 |
| A09 | Hard stop (housing) to latch point (shell) (2x) | **3.60** | **0.11** |
| A10 | Connector overall length | 13.45 | Ref |
| A11 | Connector overall height from bottom of housing surface (Datum A) to top surface of shell | 6.66 | 0.08 |
| A12 | Locating peg length (2X) | 0.56 | 0.10 |
| A13 | Connector overall width | 3.43 | Ref |
| A14 | REMOVED FROM DRAWING | | |
| A15 | REMOVED FROM DRAWING | | |
| A16 | Horizontal CL of solder tail array (Datum C) to CL of left locating peg | 0.95 | Basic |
| A17 | Left locating peg diameter | **0.85** | **MAX** |
| A18 | Vertical CL of solder tail array (Datum B) to CL of left locating peg | 5.62 | Basic |
| A19 | Vertical CL of solder tail array (Datum B) to CL of right locating peg | 6.28 | Basic |
| A20 | Vertical CL of solder tail array (Datum B) to CL of outside solder tails (long offset from Datum B) (2X) | 5.25 | Basic |
| A21 | Vertical CL of solder tail array (Datum B) to CL of inside solder tails (short offset from Datum B) (2X) | 4.75 | Basic |
| A22 | Edge of Row A solder tail contacts to edge of Row B ssolder ttail ccontacts. (Datum C) | 3.14 | 0.16 |
| A23 | Right locating peg diameter | **0.85** | **MAX** |
| A24 | Horizontal CL of ssolder ttail aarray (Datum C) to CL of right locating peg | 1.31 | Basic |
| A25 | REMOVED FROM DRAWING | | |



New Content

## Table 4-1. x4 Fixed Host Board-side Vertical Connector Dimensions (Continued)

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| A26 | Horizontal CL of Solder Tail Array (Datum C) to edge large right Solder Leg | 0.94 | 0.19 |
| A27 | Solder Tail Contact pitch - Typical | 0.50 | Basic |
| A28 | Outer solder tails CL to CL (lower left B1 to upper right A21) (Datum B) | 10.50 | Basic |
| A29 | Solder tail width (solder pad contact area) - Typical | 0.26 | 0.03 |
| A30 | Datum B to end of left solder leg of shell | 7.69 | 0.05 |
| A31 | Length from end of left to end of right solder legs | 15.38 | 0.10 |
| **Figure 4-3** | | | |
| A32 | Interface (inside shell) cavity width | 12.85 | 0.03 |
| A33 | Outer contacts CL to CL (upper left B1 to lower right A21) | 10.50 | Basic |
| A34 | Vertical CL of interface paddle length (Datum D) to CL inner terminals (2x) (short offset from Datum D) | 4.75 | Basic |
| A35 | Vertical CL of interface paddle length (Datum D) to CL outer terminals (2x) (long offset from Datum D) | 5.25 | Basic |
| A36 | Inside radius of Fixed connector Shell (5X) | 0.30 | 0.05 |
| A37 | Interface (inside shell) cavity height | 2.83 | 0.04 |
| A38 | Vertical CL of interface paddle length (Datum D) to inside shell radius | 5.23 | 0.06 |
| A39 | Interface Paddle length | 11.20 | 0.03 |
| A40 | Horizontal CL of interface paddle (Datum E) to inside shell radius | 0.25 | 0.09 |
| A44 | Interface paddle length minus the orientation feature width | 10.70 | 0.03 |
| A41 | Interface paddle thickness (over top of contact beams; plastic/paddle must be below top of contact beams) | 1.08 | 0.06 |
| A42 | Orientation feature (on paddle) thickness | 0.54 | 0.03 |
| A43 | Orientation feature (on paddle) width | 0.48 | Ref |
| A05 | Fixed connector contact pitch (Repeated Dimension) | 0.50 | Basic |
| A06 | Fixed connector contact width (Repeated Dimension) | 0.30 | 0.03 |

# Request Request Request Request Request Request

## Table 4-1. Dimensions for x4 Fixed Host Board-side Vertical Form Factors (Continued)

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| A26 | Solder tail contact pitch - Typical | 0.50 | Basic |
| A27 | Outer solder tails CL to CL (lower left B1 to upper right A21) (Datum B) | 10.50 | Basic |
| A28 | Solder tail width- Typical | 0.26 | 0.03 |
| A29 | REMOVED FROM DRAWING | | |
| A31 | REMOVED FROM DRAWING | | |
| A30 | Interface (inside shell) cavity width | 12.85 | **Basic** |
| A31 | Outer contacts CL to CL (upper left B1 to lower right A21) | 10.50 | Basic |
| A32 | Vertical CL of interface paddle length (Datum D) to CL outer terminals (2x) (long offset from Datum D) | **5.25** | Basic |
| A33 | Vertical CL of interface paddle length (Datum D) to CL inner terminals (2x) (short offset from Datum D) | **4.75** | Basic |
| A34 | Inner radius of Fixed connector shell (5X) | 0.30 | **Basic** |
| A35 | Interface (inside shell) cavity height | 2.83 | **Basic** |
| A36 | Vertical CL of interface paddle length (Datum D) to inner sharp corner of shell (TSC) | **5.28** | **Basic** |
| A37 | Interface p~~P~~addle length | 11.20 | 0.03 |
| A38 | Horizontal CL of interface paddle (Datum E) to inside shell radius | 0.25 | **Basic** |
| A44 | REMOVED FROM DRAWING | | |
| A39 | Interface paddle thickness (Datum E) -measured over top of contact beams; plastic/paddle must be below top of contact beams | 1.08 | 0.06 |
| A40 | Polarizing notch height | 0.54 | 0.03 |
| A41 | Polarizing notch width | **0.50** | **MIN** |
| Note: These dimensions apply to Figures 4-2, 4-3 and 4-4. | | | |



New Content

# Request Request Request Request Request Request

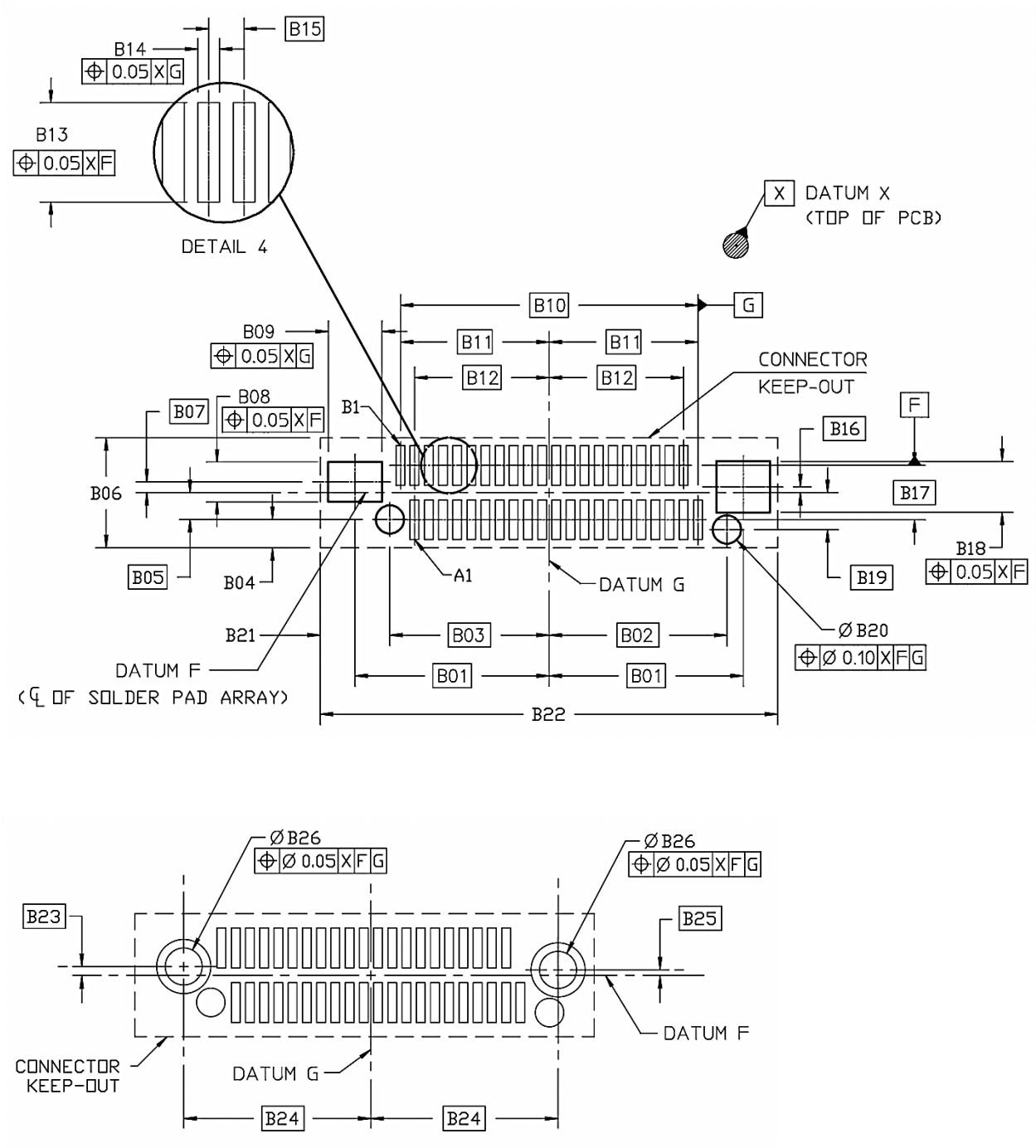



**Figure 4-4. x4 Fixed Host Board-side Vertical Connector Footprint**

# Request Request Request Request Request Request

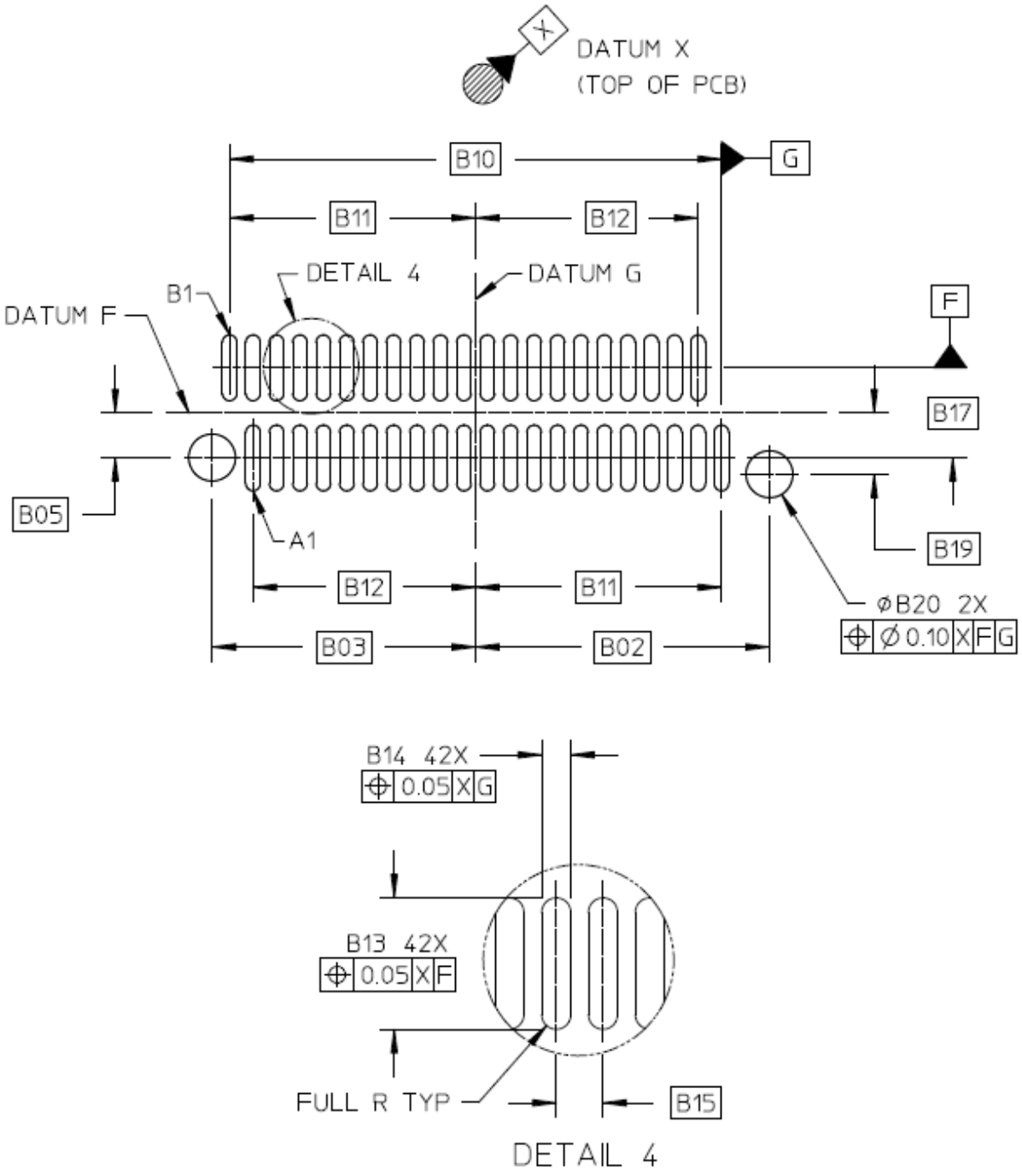



**Figure 4-5. x4 Fixed Host Board-side Vertical Form Factor Normative Footprint Features**

**Note:** Refer to Appendix G for examples of shell hold-downs and keep-out zones.

*(EDITORS NOTE: This appendix is to be added via another ECR.)*

# Request Request Request Request Request Request

## Table 4-2. Dimensions for x4 Fixed Host Board-side Vertical Connector Footprint

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| B01 | Vertical CL of solder pad array (Datum G) to CL of (shell) solder pads | 6.85 | Basic |
| B02 | Vertical CL of solder pad array (Datum G) to CL of outboard (right) locating hole | 6.28 | Basic |
| B03 | Vertical CL of solder pad array (Datum G) to CL of inboard (left) locating hole | 5.62 | Basic |
| B04 | CL of inboard locating hole to keep-out zone (length) | 1.21 | 0.15 |
| B05 | Horizontal CL of solder pad array (Datum F) to CL of inboard (left) locating hole | 0.95 | Basic |
| B06 | Connector keep-out zone height | 4.32 | 0.15 |
| B07 | Horizontal CL of solder pad array (Datum F) to CL of small (left) solder pad | 0.37 | Basic |
| B08 | Small (shell) solder pad height | 1.40 | 0.10 |
| B09 | (Shell) solder pad width (2X) | 1.90 | 0.10 |
| B10 | CL to CL of outer solder pads (horizontal) | 10.50 | Basic |
| B11 | Vertical CL of solder pad array (Datum G) to CL outside solder pads | 5.25 | Basic |
| B12 | Vertical CL of solder pad array (Datum G) to CL inside solder pads | 4.75 | Basic |
| B13 | Signal solder pad length (42x) | 1.40 | 0.05 |
| B14 | Signal solder pad width (42x) | 0.31 | 0.05 |
| B15 | Solder pad pitch | 0.50 | Basic |
| B16 | Horizontal CL of solder pad array (Datum F) to CL of large solder-pad | 0.20 | Basic |
| B17 | Horizontal CL (Row A) to CL (Row B) solder pads | 1.91 | Basic |
| B18 | Large (shell) solder pad height | 1.80 | 0.15 |
| B19 | Horizontal CL of solder pad array (Datum F) to CL outboard (right) locating hole | 1.31 | Basic |
| B20 | Locating hole diameter (2X) | 1.00 | 0.05 |
| B21 | CL of inboard (left) locating hole to keep-out zone | 2.68 | 0.15 |
| B22 | Connector keep-out zone length | 16.60 | 0.15 |
| B23 | Datum F to CL of hole for left shell solder tail hole | 0.31 | Basic |
| B24 | Datum G to CL of left and right shell solder tails | 6.58 | Basic |
| B25 | Datum F to CL of right shell solder tail hole | 0.19 | Basic |
| B26 | Diameter of plated thru holes for shell solder tails | 1.30 | 0.10 |

# Request Request Request Request Request Request

## Table 4-2. Dimensions for x4 Fixed Host Board-side Vertical Form Factor Normative Footprint Features

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| B01 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB06) | | |
| B02 | Vertical CL of solder pad array (Datum G) to CL of right locating hole | 6.28 | Basic |
| B03 | Vertical CL of solder pad array (Datum G) to CL of left locating hole | 5.62 | Basic |
| B04 | REMOVED FROM DRAWING (EDITOR'S NOTE: Height of keep- out now split over Datum F (see Appendix G); dimension no longer needed) | | |
| B05 | Horizontal CL of solder pad array (Datum F) to CL of left locating hole | 0.95 | Basic |
| B06 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB07 (SMT) & BB14 (Thru hole)) | | |
| B07 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB04) | | |
| B08 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB02) | | |
| B09 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB01) | | |
| B10 | CL to CL of outer solder pads (Datum G) | 10.50 | Basic |
| B11 | Vertical CL of solder pad array (Datum G) to CL outside solder pads | 5.25 | Basic |
| B12 | Vertical CL of solder pad array (Datum G) to CL inside solder pads | 4.75 | Basic |
| B13 | Solder pad length (42X) | 1.40 | 0.05 |
| B14 | Solder pad width (42X) | 0.31 | 0.05 |
| B15 | Solder pad pitch | 0.50 | Basic |
| B16 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB05) | | |
| B17 | Horizontal CL (Row A) to CL (Row B) solder pads | 1.91 | Basic |
| B18 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB03) | | |
| B19 | Horizontal CL of solder pad array (Datum F) to CL right locating hole | 1.31 | Basic |
| B20 | Locating hole diameter (2X) | 1.00 | 0.05 |
| B21 | REMOVED FROM DRAWING (EDITOR'S NOTE: Width of keep-out now split over Datum G (see Appendix G); dimension no longer needed) | | |
| B22 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB08 (SMT); BB15 (Thru hole) | | |
| B23 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB11) | | |
| B24 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB13) | | |
| B25 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB12) | | |
| B26 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; BB09 & BB10) | | |



New Content

## 4.3 Fixed Host Board-side Right Angle Connector

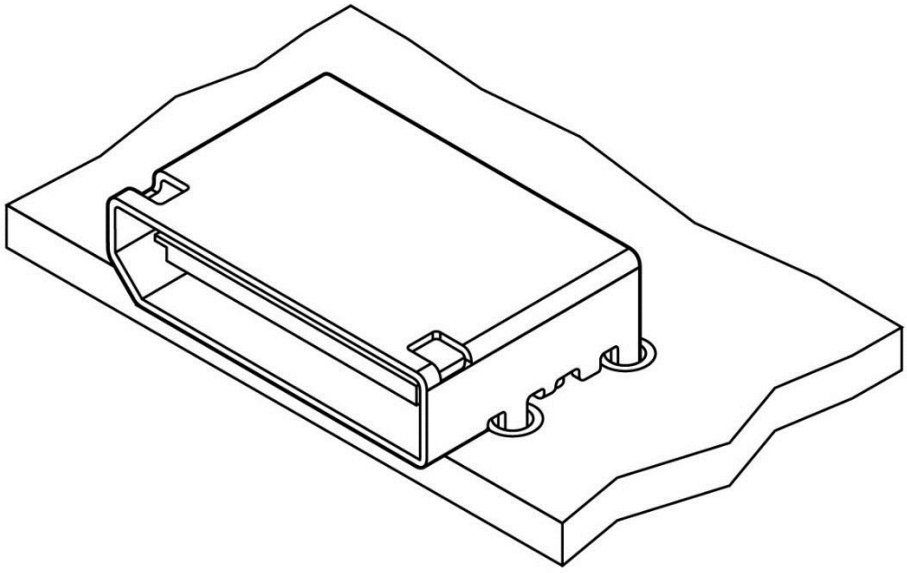


**Figure 4-5. Isometric View of the x4 Fixed Host Board-side Right Angle Connector**

## 4.2. Fixed Host Board-side Right-angle Connector

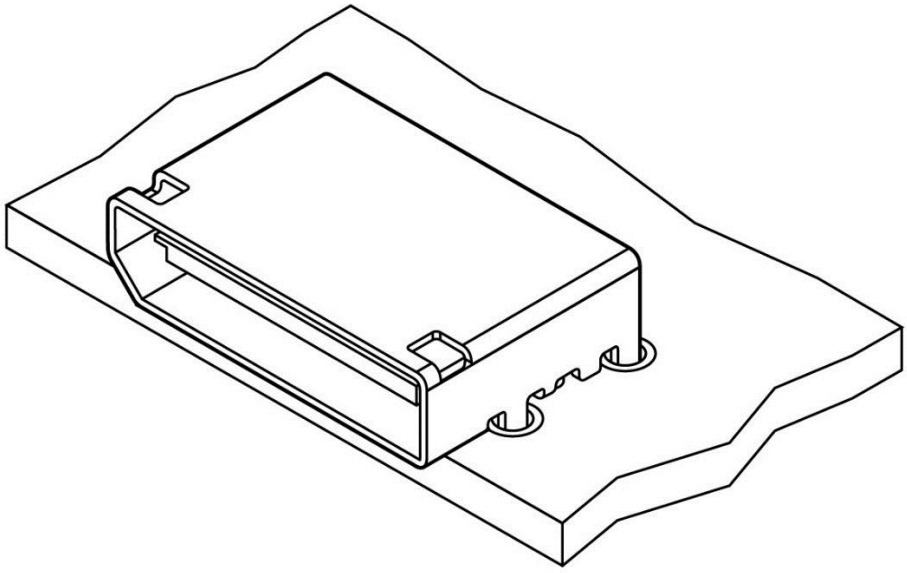


**Figure 4-6. x4 Fixed Host Board-side Right-angle Connector**

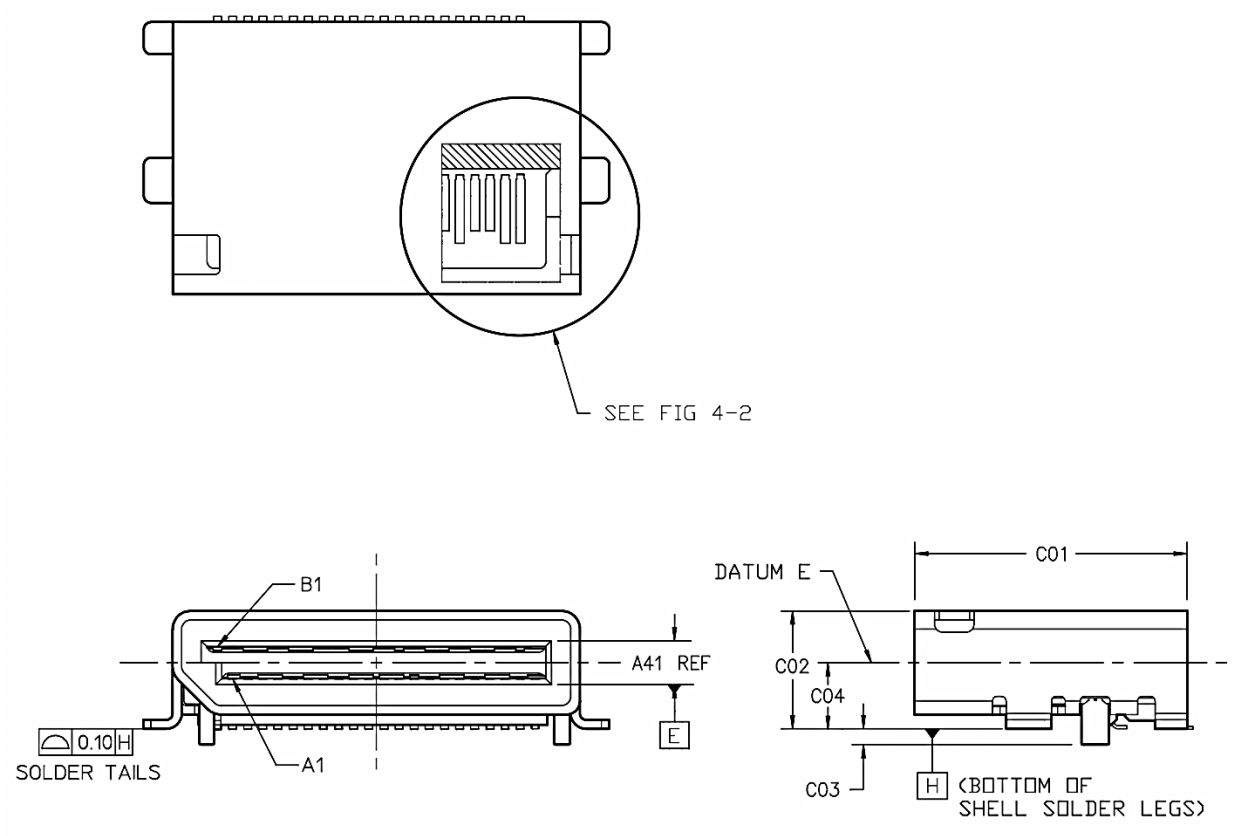



**Figure 4-6. x4 Fixed Host Board-side Right Angle Connector Form Factor**

Note: The x4 Fixed Host Board-side Right Angle Connector Mating Interface Dimensions are the same as for the Vertical version (see Figure 4-3).

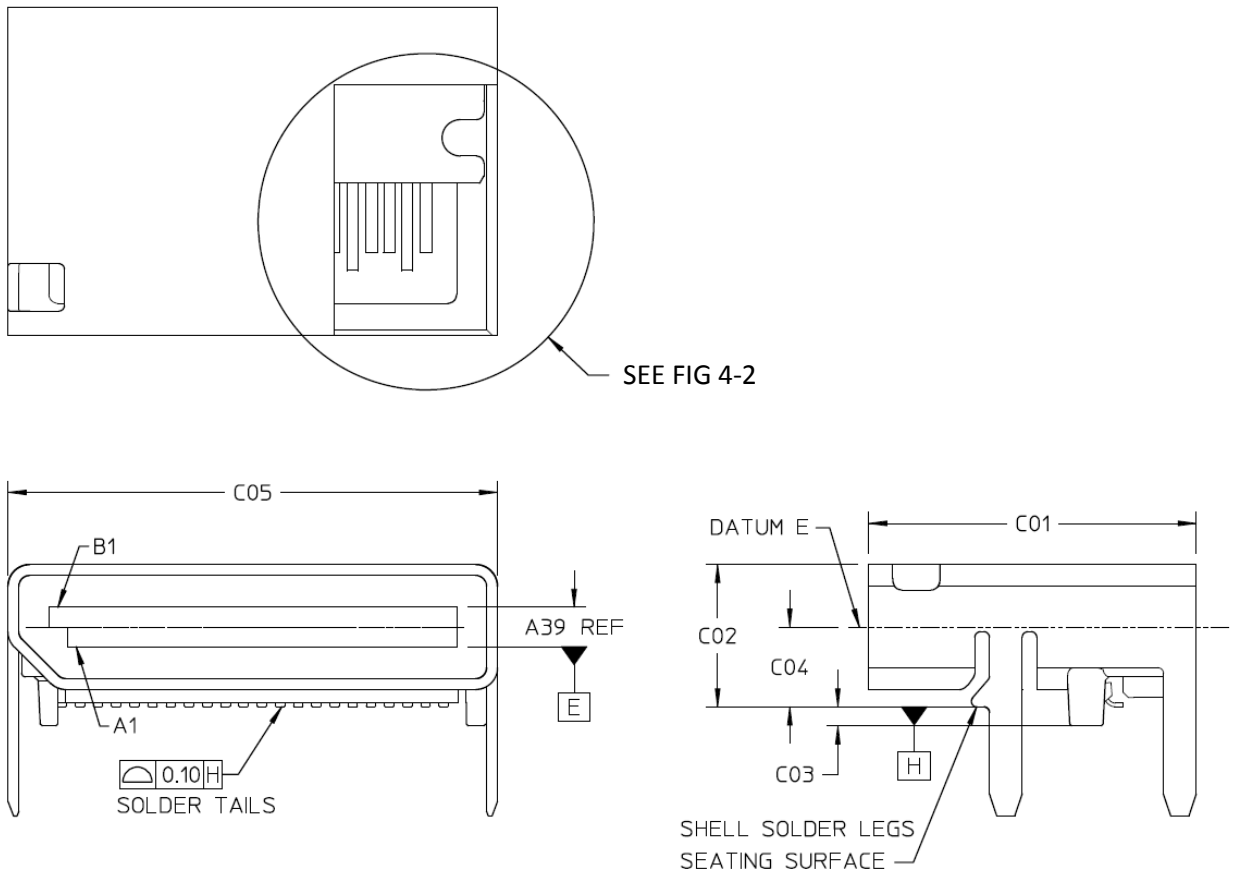



**Figure 4-7. x4 Fixed Host Board-side Right-Angle Form Factor**

**Note:** The mating interface for x4 fixed host board-side right-angle connectors is the same as for the vertical version (see Figure 4-4). Refer to Chapter 3 for connector pinouts and contact sequencing.

# Request Request Request Request Request Request

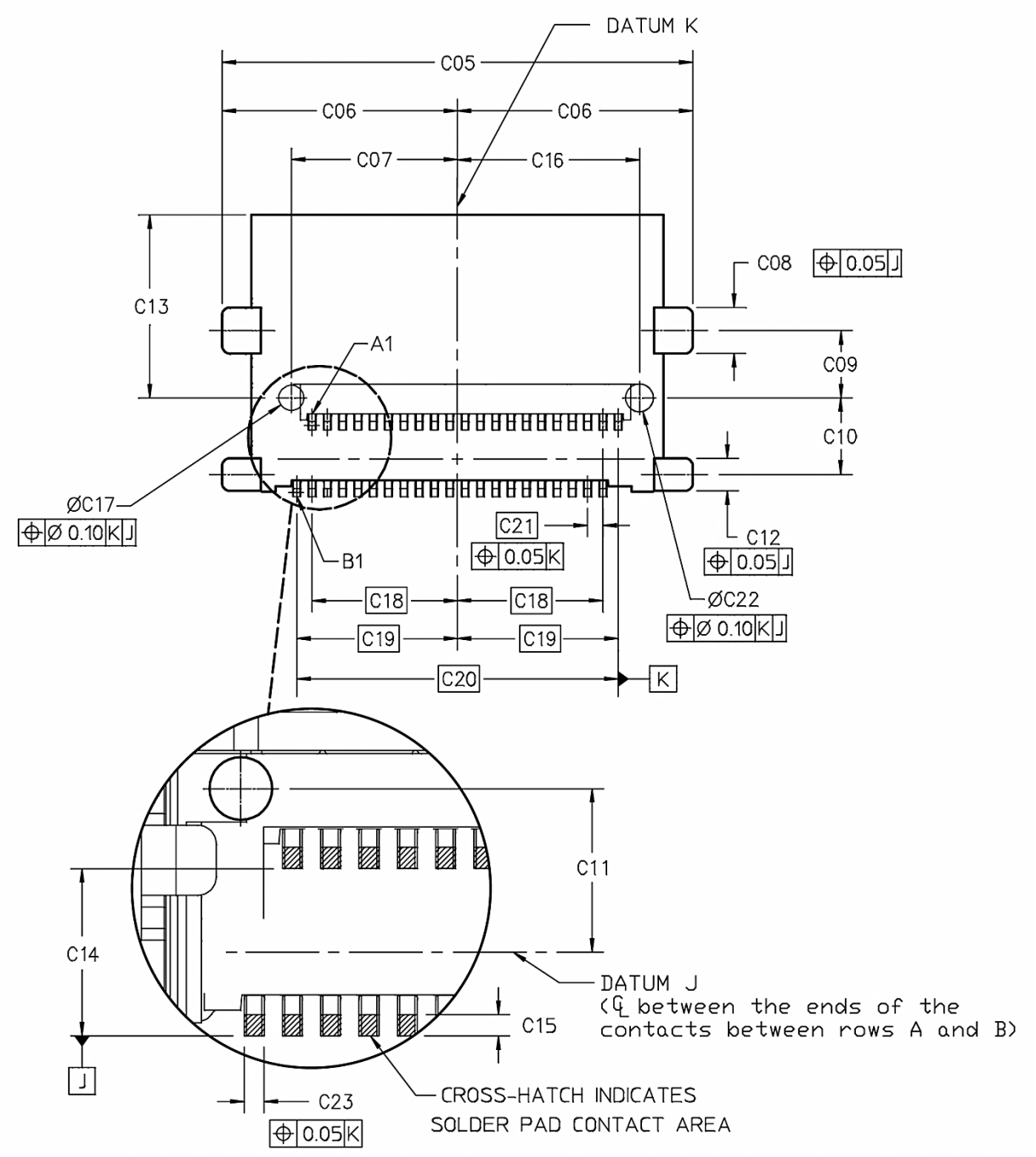



**Figure 4-7. x4 Fixed Host Board-side Right Angle Connector Form Factor**

**Note:** The x4 Fixed Host Board-side Right Angle Connector Mating Interface Dimensions are the same as for the Vertical version (see Figure 4-3).

# Request Request Request Request Request Request

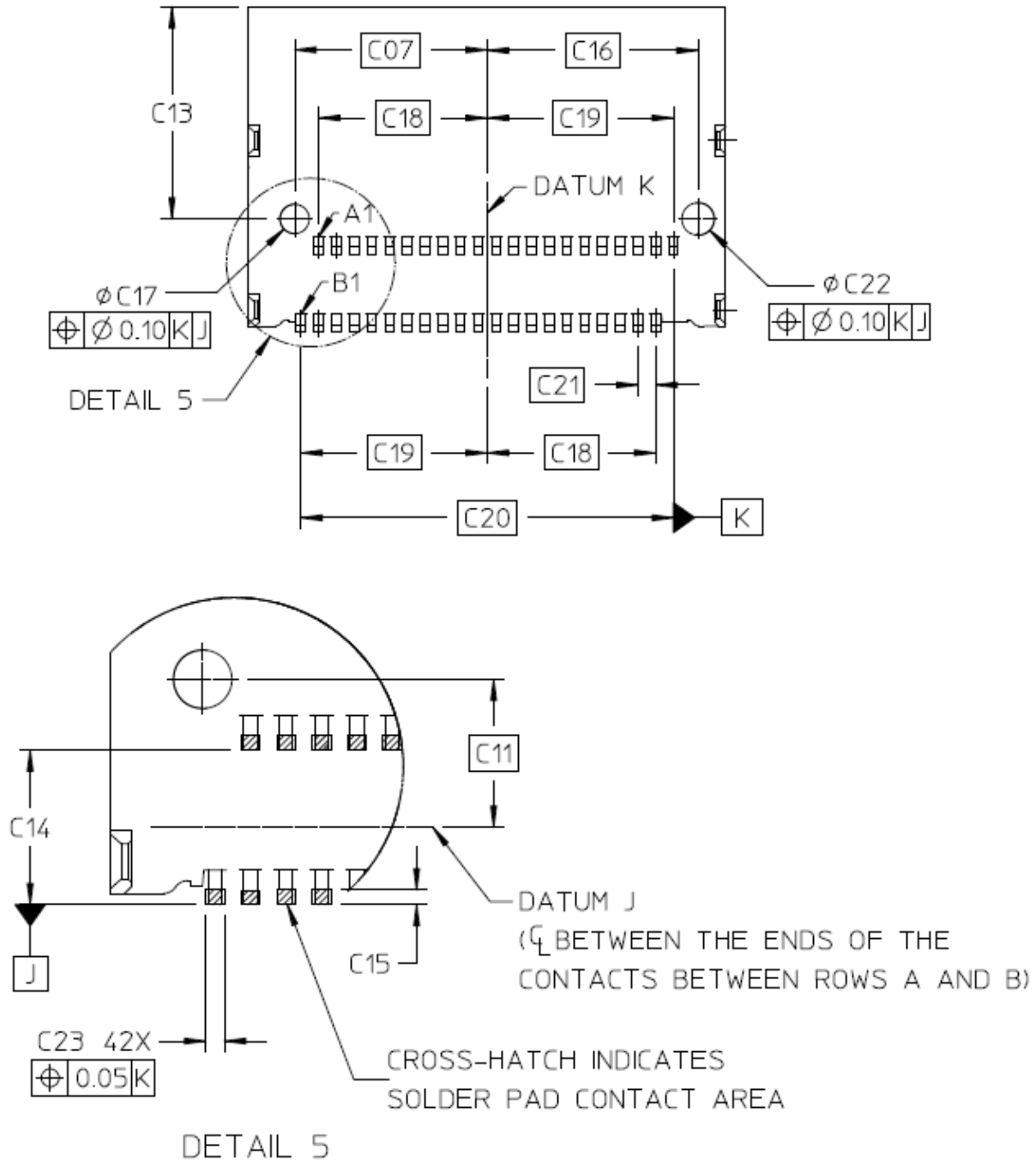



**Figure 4-8. Bottom View of x4 Fixed Host Board-side Right-Angle Form Factor**

**Note:** The mating interface for x4 fixed host board-side right-angle connectors is the same as for the vertical version (see Figure 4-4).

# Request Request Request Request Request Request

## Table 4-3. x4 Fixed Host Board-side Right Angle Connector Dimensions

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| C01 | Connector (shell) length | 9.00 | 0.05 |
| C02 | Connector (shell) height from bottom of shell solder legs (Datum H) | 3.90 | Ref |
| C03 | Locating peg length (2X) | 0.52 | 0.10 |
| C04 | CL of interface paddle thickness (Datum E) to bottom of shell solder legs (Datum H) | 2.19 | 0.08 |
| C05 | Length from end of left to end of right solder legs | 15.38 | 0.10 |
| C06 | Vertical CL of solder tail array (Datum K) to outside edge solder leg (2X) | 7.69 | 0.05 |
| C07 | Vertical CL of solder tail array (Datum K) to CL of left locating peg | 5.42 | 0.08 |
| C08 | Large shell solder leg width | 1.50 | 0.10 |
| C09 | Horizontal CL locating pegs to CL of large solder legs | 2.20 | 0.11 |
| C10 | Horizontal CL locating pegs to CL of small solder leg | 2.50 | 0.11 |
| C11 | Horizontal CL of locating pegs to CL solder tail array (Datum J) | 2.14 | 0.19 |
| C12 | Small solder leg width | 1.06 | 0.10 |
| C13 | Horizontal CL of locating pegs to front of shell | 5.97 | 0.11 |
| C14 | End of solder tail Row “A” contacts to end of solder tail Row “B” contacts | 2.18 | 0.16 |
| C15 | Length of solder pad contact area | 0.28 | 0.03 |
| C16 | Vertical CL of solder tail array (Datum K) to CL of right locating peg | 5.95 | 0.08 |
| C17 | Small (left) locating peg diameter | 0.82 | +0.03/-0.15 |
| C18 | Vertical CL of solder tail array (Datum K) to CL of inside solder tails | 4.75 | Basic |
| C19 | Vertical CL of solder tail array (Datum K) to CL of outside solder tails | 5.25 | Basic |
| C20 | CL to CL of outside solder tails | 10.50 | Basic |
| C21 | Solder tail contact pitch | 0.50 | Basic |
| C22 | Right locating peg diameter | 0.97 | +0.03/-0.15 |
| C23 | Solder tail width (solder pad contact area) (42x) | 0.26 | 0.03 |

# Request Request Request Request Request Request

## Table 4-3. Dimensions for x4 Fixed Host Board-side Right-Angle Form Factor

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| C01 | Connector depth | 9.00 | 0.05 |
| C02 | Connector height from bottom of shell seating surface (Datum H) | 3.90 | Ref |
| C03 | Locating peg length (2X) | 0.52 | 0.10 |
| C04 | CL of interface paddle thickness (Datum E) to bottom of shell seating surface (Datum H) | 2.19 | 0.08 |
| C05 | Connector length | **13.45** | 0.10 |
| C06 | REMOVED FROM DRAWING | | |
| C07 | Vertical CL of solder tail array (Datum K) to CL of left locating peg | 5.42 | **Basic** |
| C08 | REMOVED FROM DRAWING | | |
| C09 | REMOVED FROM DRAWING | | |
| C10 | REMOVED FROM DRAWING | | |
| C11 | Horizontal CL of locating pegs to CL solder tail array (Datum J) | 2.14 | **Basic** |
| C12 | REMOVED FROM DRAWING | | |
| C13 | Horizontal CL of locating pegs to front of shell | 5.97 | 0.11 |
| C14 | End of solder tail Row “A” contacts to end of solder tail Row “B” contacts (Datum J) | 2.18 | 0.16 |
| C15 | Length of solder pad contact area (42X) | 0.28 | 0.03 |
| C16 | Vertical CL of solder tail array (Datum K) to CL of right locating peg | 5.95 | **Basic** |
| C17 | Left locating peg diameter | **0.85** | **MAX** |
| C18 | Vertical CL of solder tail array (Datum K) to CL of inside solder tails | 4.75 | Basic |
| C19 | Vertical CL of solder tail array (Datum K) to CL of outside solder tails | 5.25 | Basic |
| C20 | CL to CL of outside solder tails (Datum K) | 10.50 | Basic |
| C21 | Solder tail pitch | 0.50 | Basic |
| C22 | Right locating peg diameter | **0.85** | **MAX** |
| C23 | Width of solder pad contact area (42X) | 0.26 | 0.03 |
| Note: These dimensions apply to Figures 4-7 and 4-8. | | | |



New Content

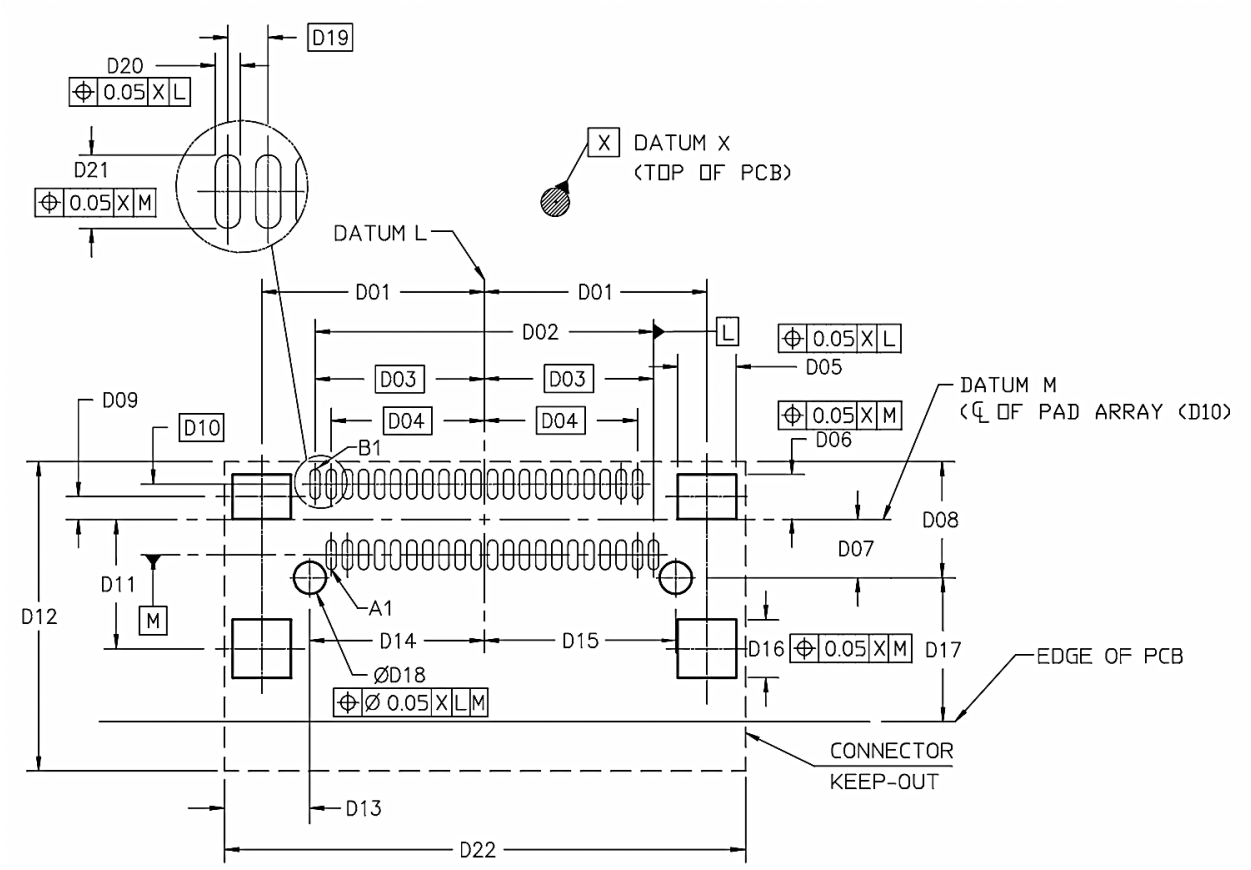



**Figure 4-8. x4 Fixed Host Board-side Right Angle Connector Contact Footprint**

# Request Request Request Request Request Request

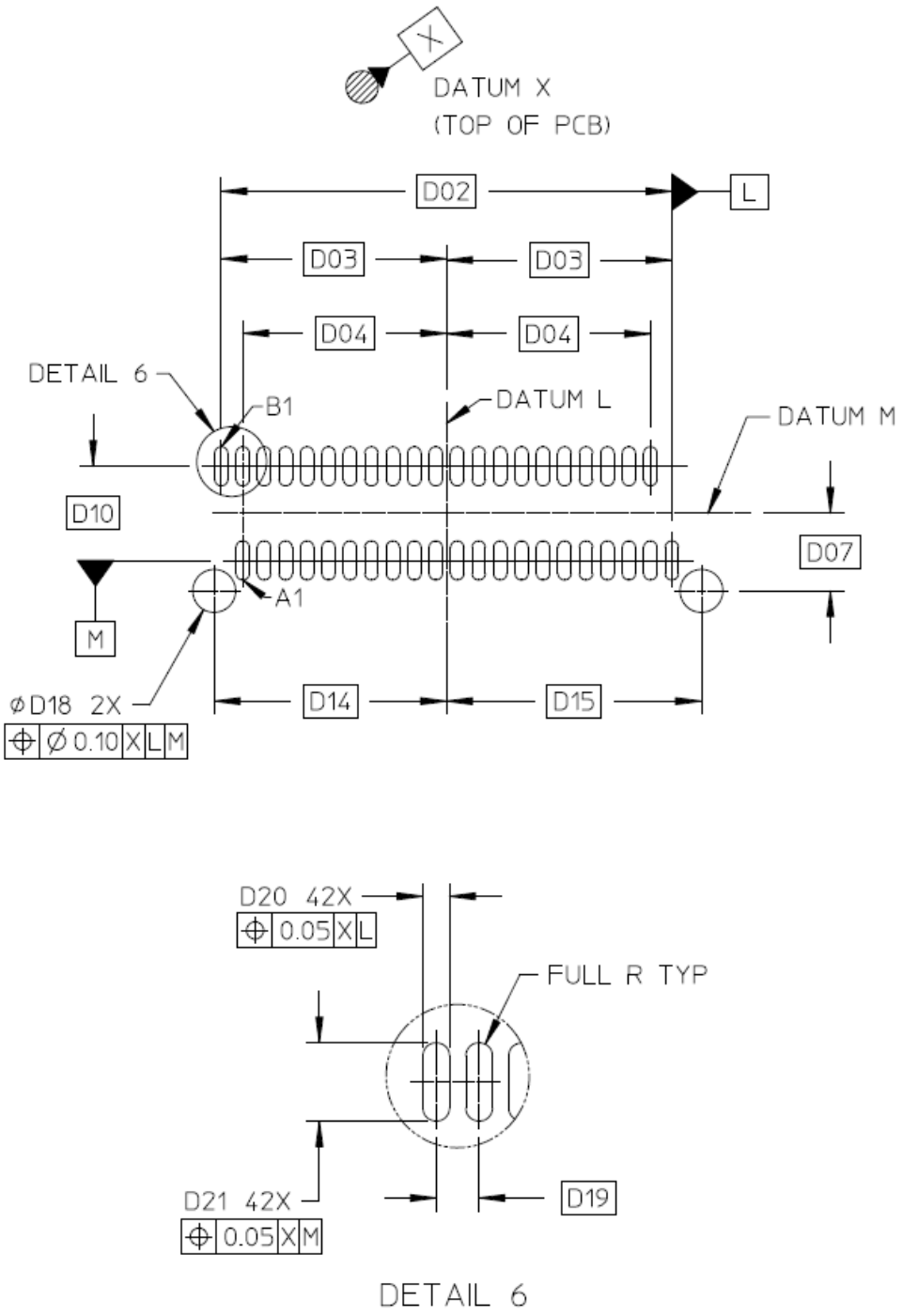



**Figure 4-9. x4 Fixed Host Board-side Right-Angle Form Factor Normative Footprint Features**

**Note:** Refer to Appendix G for examples of shell hold-downs and keep-out zones.

## Table 4-4. Fixed Host Board-side x4 Right Angle Connector Contact Footprint Dimensions

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| D01 | Vertical CL of solder pad array (Datum L) to CL shell solder pads (4X) | 6.91 | 0.05 |
| D02 | Vertical CL to CL of outside shell solder pads | 10.50 | 0.05 |
| D03 | Vertical CL of solder pad array (Datum L) to outside solder pads | 5.25 | Basic |
| D04 | Vertical CL of solder pad array (Datum L) to inside solder pads | 4.75 | Basic |
| D05 | Shell solder pad width (4X) | 1.81 | 0.10 |
| D06 | Small shell solder pad length (2X) | 1.38 | 0.10 |
| D07 | Horizontal CL of locating holes to CL of solder pad array (Datum M) | 1.81 | 0.10 |
| D08 | CL locating holes to back keep-out | 3.45 | 0.10 |
| D09 | Horizontal CL of solder pad array (Datum M) to CL of small shell solder pads (2X) | 0.71 | 0.10 |
| D10 | Horizontal CL of row B solder pads to CL of row A Solder-Pads | 2.19 | Basic |
| D11 | Horizontal CL of solder-Pad Array (Datum M) to CL of large shell solder pads (2X) | 4.01 | 0.05 |
| D12 | Connector (shell) depth keep-out zone | 10.42 | 0.15 |
| D13 | CL locating hole to left side of connector keep-out zone | 6.47 | 0.15 |
| D14 | Vertical CL of solder pad array (Datum L) to CL left locating hole | 5.41 | 0.05 |
| D15 | Vertical CL of solder pad array (Datum L) to CL right locating hole | 5.94 | 0.05 |
| D16 | Large shell solder pad length (2X) | 1.80 | 0.10 |
| D17 | Horizontal CL of locating holes to front edge of PCB | 4.46 | 0.10 |
| D18 | Locating hole diameter (2X) | 1.00 | 0.05 |
| D19 | Solder pad pitch | 0.50 | Basic |
| D20 | Solder pad width (42x) | 0.31 | 0.03 |
| D21 | Solder pad length (42x) | 0.91 | 0.03 |
| D22 | Horizontal width of connector keep-out zone | 17.25 | 0.15 |

# Request Request Request Request Request Request

## Table 4-4. Dimensions for x4 Fixed Host Board-side Right-Angle Form Factor Normative Footprint Features

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| D01 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD06) | | |
| D02 | Vertical CL to CL of outer solder pads (Datum L) | 10.50 | **Basic** |
| D03 | Vertical CL of solder pad array (Datum L) to CL outside solder pads | 5.25 | Basic |
| D04 | Vertical CL of solder pad array (Datum L) to CL inside solder pads | 4.75 | Basic |
| D05 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD01) | | |
| D06 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD02) | | |
| D07 | Horizontal CL of locating holes to CL of solder pad array (Datum M) | 1.81 | **Basic** |
| D08 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD07 (SMT) & DD15 (Thru Hole)) | | |
| D09 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD04) | | |
| D10 | Horizontal CL of ~~r~~Row B solder pads to CL of ~~r~~Row A solder pads (Datum M) | 2.19 | Basic |
| D11 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD05) | | |
| D12 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD08 (SMT) & DD16 (Thru hole)) | | |
| D13 | REMOVED FROM DRAWING (EDITOR'S NOTE: Width of keep-out now split over Datum L; dimension no longer needed) | | |
| D14 | Vertical CL of solder pad array (Datum L) to CL left locating hole | 5.41 | **Basic** |
| D15 | Vertical CL of solder pad array (Datum L) to CL right locating hole | 5.94 | **Basic** |
| D16 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD03) | | |
| D17 | REMOVED FROM DRAWING (EDITOR'S NOTE: distance to edge of PCB is application specific) | | |
| D18 | Locating hole diameter (2X) | 1.00 | 0.05 |
| D19 | Solder pad pitch | 0.50 | Basic |
| D20 | Solder pad width (42x) | 0.31 | 0.03 |
| D21 | Solder pad length (42x) | 0.91 | 0.03 |
| D22 | REMOVED FROM DRAWING (EDITOR'S NOTE: moved to Appendix G; DD09 (SMT) & DD17 (Thru hole)) | | |



New Content

# 4.4. x4 Fixed Host Board-side Connector Latching

- The windows in the top of the x4 Fixed Host Board-side right angle connector and the windows in the side wall of the Fixed (host-side) vertical connector serve as the latching points for the Free (Cable-side) latches (see Chapter 6).
- The windows accept both passive and active latching solutions that are defined on the Free Cable-side. The windows are located in relation to the connector contacts to enable the Cable-side to reliably mate to the host-side connector with acceptable minimum contact wipe in worst case tolerance conditions.
- As the x4 Fixed (Board-side) connectors are the same for both external and internal applications, the latch points are the same for both (see Figure 4-2).

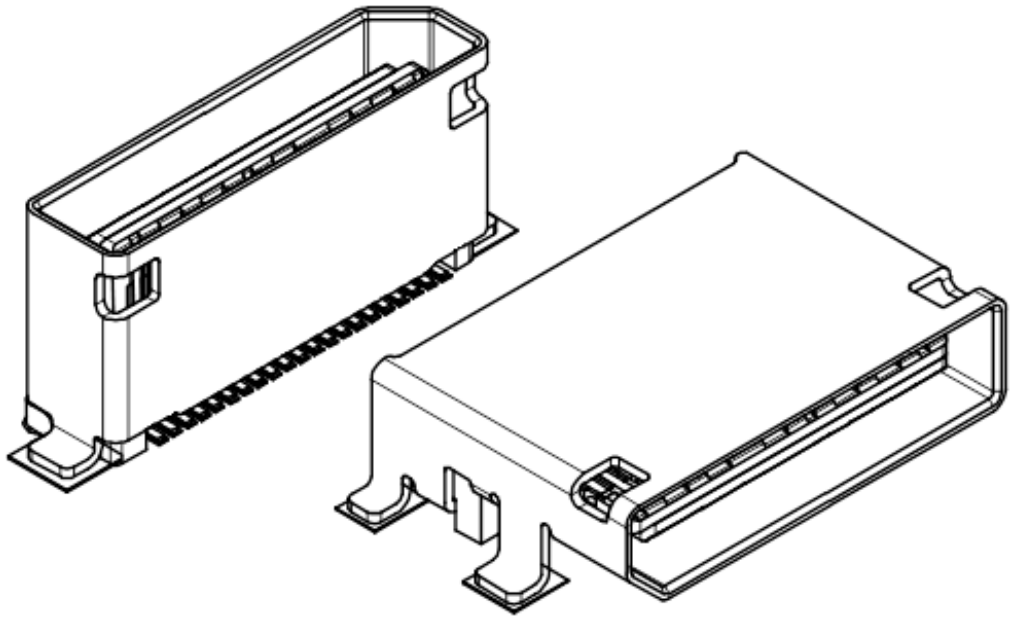


**Figure 4-9. Isometrics of x4 Fixed Host Board-side Connectors with Latching Window Detail**

# 4.3. x4 Fixed Host Board-side Connector Latching

All fixed host board-side connectors contain latch windows. These windows:

- Are located on the top of the x4 fixed host board-side right-angle connector and in the side wall of the fixed host board-side vertical connector (see Figure 4-10).
- Serve as the latching points for the free cable-side connectors (see Section 6-4).
- Accept both passive and active latches from the free cable-side connector. The windows are located such that cable assemblies mate reliably to the fixed host board-side connectors with acceptable minimum wipe, even under worst case tolerance conditions.
- Are the same for all fixed host board-side connectors and do not change for internal or external applications.

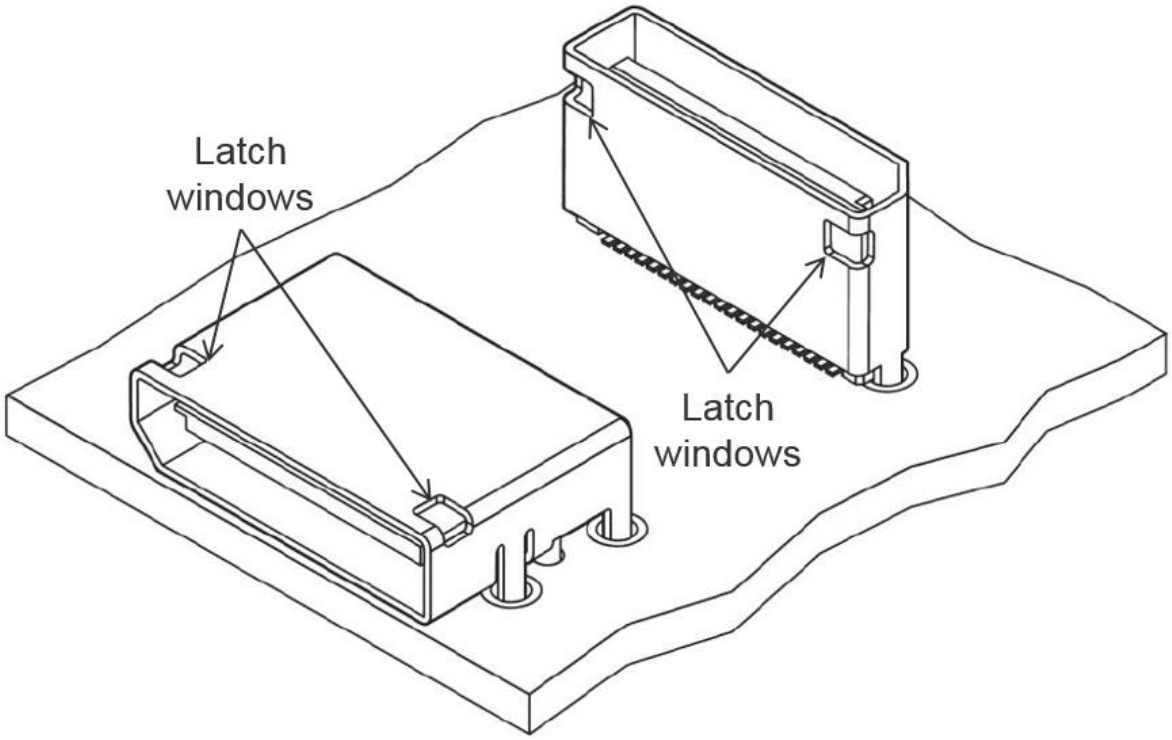


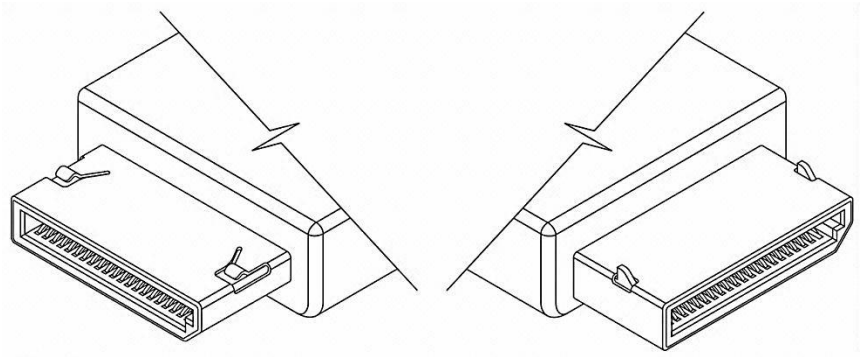

**Figure 4-10. Latch Windows in x4 Fixed Host Board-side Connectors**

5

# 5. x4 Free Cable side Connector

The x4 Free Cable-side Connector mates with all x4 Host Board-side connectors.

- It must be capable of incorporating either passive or active latching solutions for finished cable assemblies to be mechanically retained to the x4 Fixed-side connectors.
- The bulk cable to connector attachment varies by the type of bulk cable, as well as the variety of cable exit solutions, and is left to the cable assembly suppliers to define. Completed cable assemblies must comply with the cable exit form factor dimensions, defined in this Specification.



Representative Passive Latch

Representative Active Latch

**Figure 5-1. Isometric of the x4 Free Cable-side Mating Interface for all Passive and Active Latch Cable Assemblies**

# 5. x4 Free Cable-side Connector

The x4 free cable-side connector mates with all x4 fixed host board-side connectors. Free cable-side connectors:

- Support the mating interface defined in this Chapter.
- Adhere to the pin numbering scheme illustrated in Figure 5-1.
- Must be used for electrically passive and electrically active cable assemblies, for both internal and external applications
- Must incorporate either passive or active latching solutions so that they may be mechanically retained by x4 fixed host board-side connectors (see Figure 5-2).

*[EDITORS NOTE: Some of these bullets were moved from Chapter 6. Figure 5-1 was moved from Chapter 6.]*

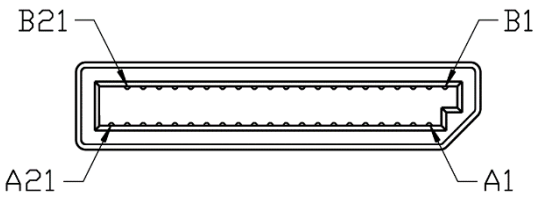



**Figure 5-1. Pin number locations for x4 Free Cable Assemblies**

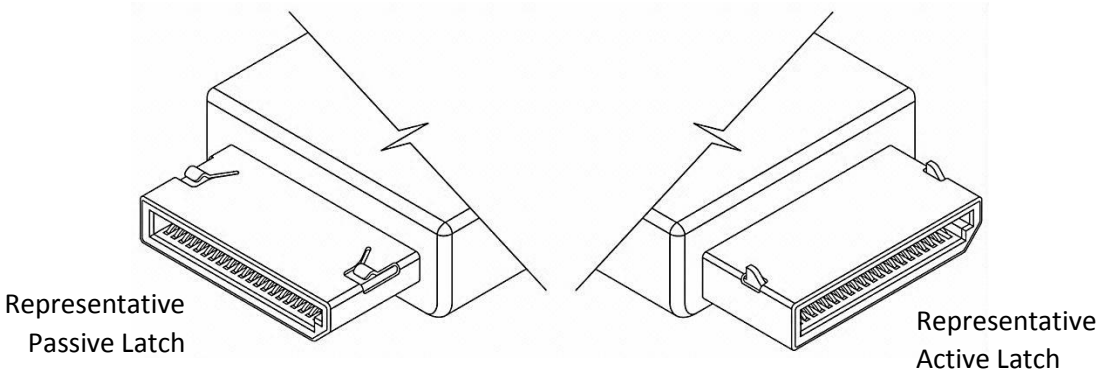



**Figure 5-2. x4 Free Cable-side Connectors with Passive and Active Latches**

# Request Request Request Request Request Request

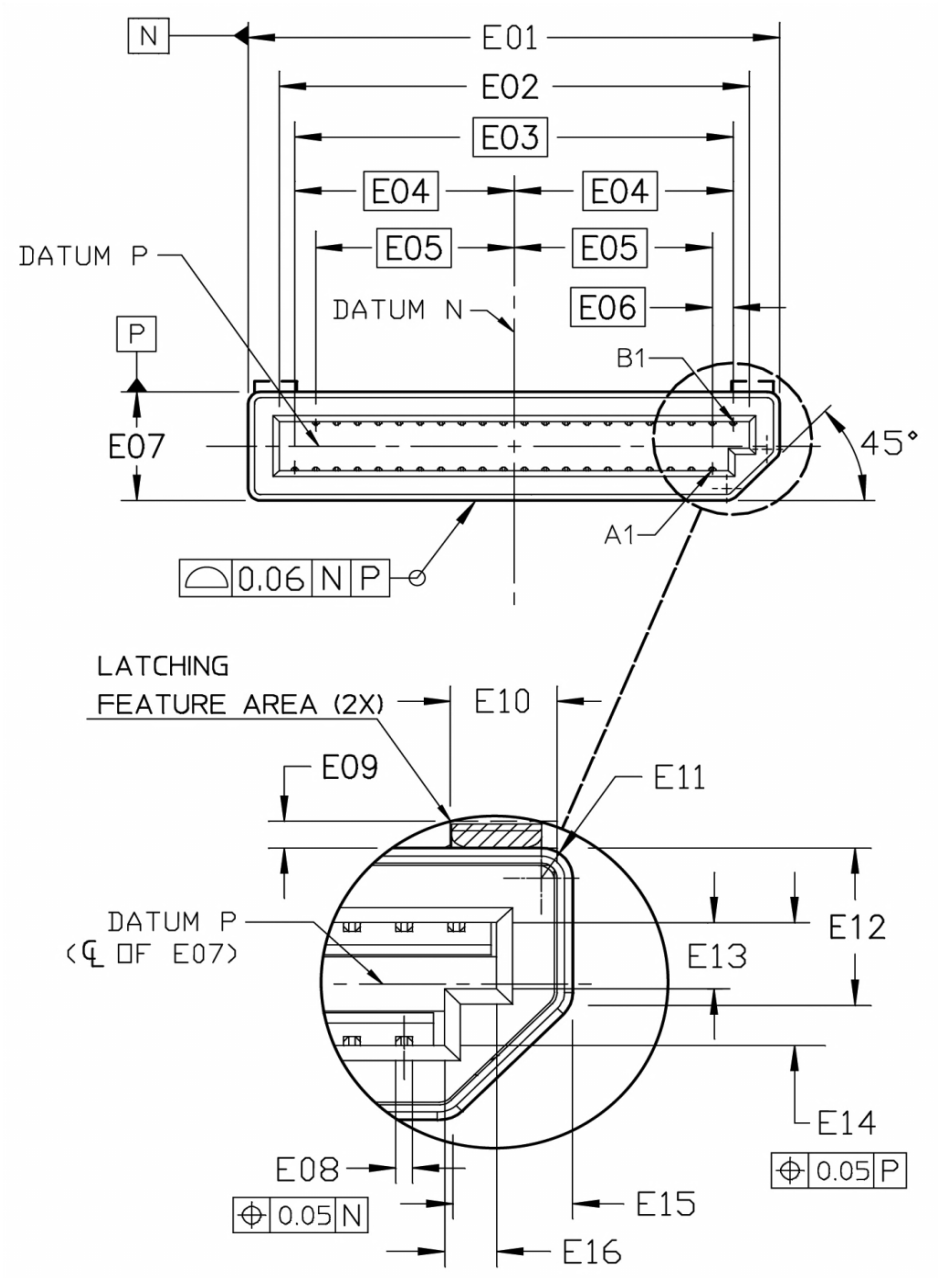



**Figure 5-2. Mating Interface for x4 Free-side Cables**

# Request Request Request Request Request Request

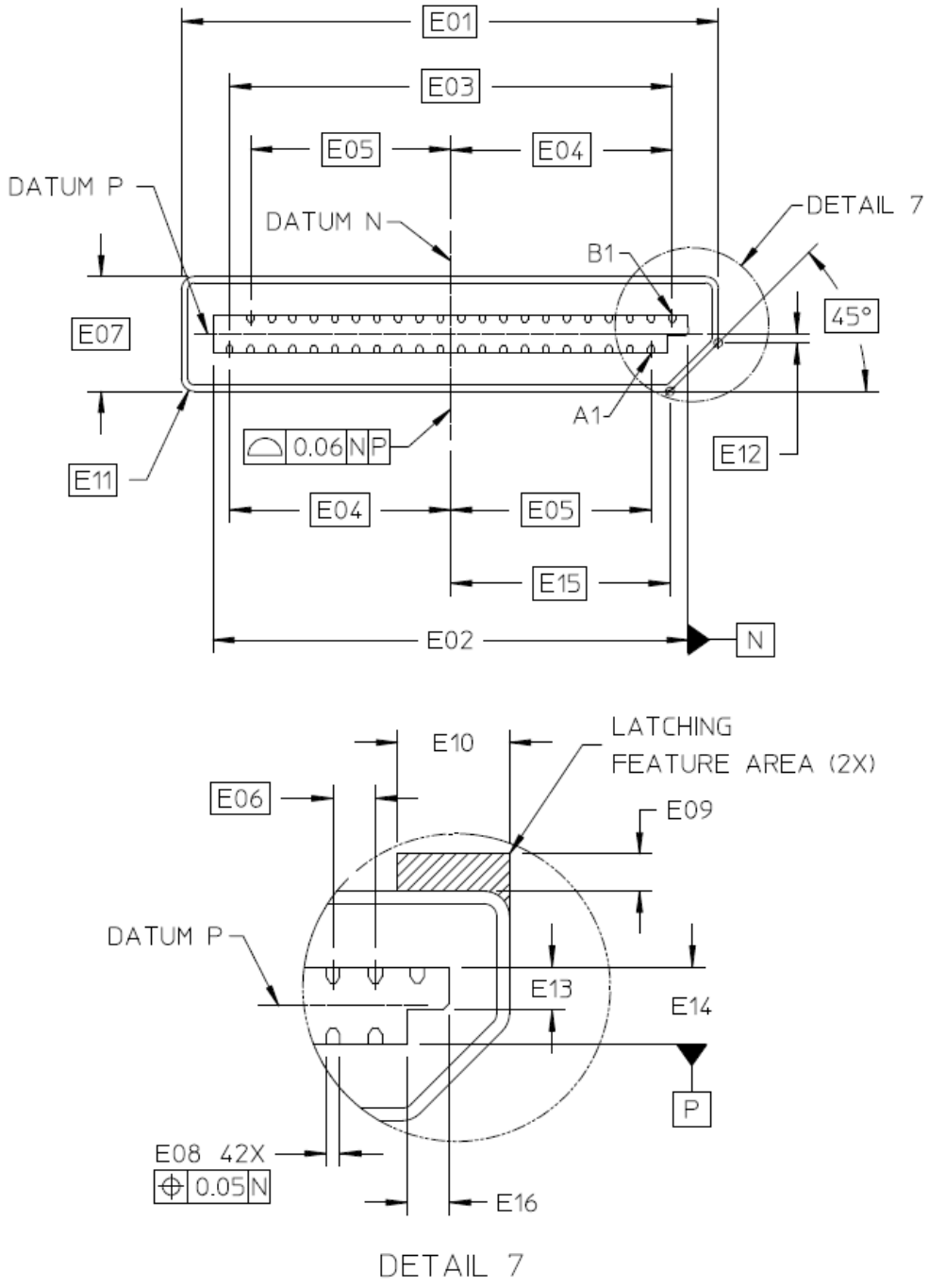



**Figure 5-3. x4 Free Cable-side Form Factor Mating Interface**

**Note:** This mating interface applies to all x4 free cable-side connectors. Additional features such as chamfers and fillets may be added as desired so long as they do not prevent contact with the surface designated "hard stop" on the fixed host board-side connector (refer to Figure 4-2) when mated.

# Request Request Request Request Request Request

## Table 5-1. Dimensions for the x4 Free-side Cable Mating Interface

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| E01 | Connector Shell width (Datum N) | 12.73 | 0.03 |
| E02 | Upper row interface width | 11.28 | 0.03 |
| E03 | CL to CL of outside of contact beams | 10.50 | Basic |
| E04 | Vertical CL of connector shell to CL outside contact beams | 5.25 | Basic |
| E05 | Vertical CL of connector shell to CL of inside contact beams | 4.75 | Basic |
| E06 | Contact beam pitch | 0.50 | Basic |
| E07 | Connector shell height (Datum P) | 2.72 | 0.03 |
| E08 | Contact beam width (42x) | 0.16 | 0.03 |
| E09 | Clearance area reserved for latching mechanism (height) (2X) | 0.43 | 0.05 |
| E10 | Clearance area reserved for latching mechanism (width) (2X) | 1.05 | 0.05 |
| E11 | Outside radius (all) | 0.30 | MAX |
| E12 | Top of shell to polarizing feature | 1.57 | 0.04 |
| E13 | Polarizing notch height | 0.67 | 0.03 |
| E14 | Interface cavity height (A side to B side) | 1.23 | 0.05 |
| E15 | Side of shell to inside polarizing feature | 1.15 | 0.05 |
| E16 | Polarizing notch width | 0.50 | Ref |
| E17 | Interface width minus the polarizing feature | 10.70 | 0.03 |

# Request Request Request Request Request Request

## Table 5-1. Dimensions for x4 Free Cable-side Form Factor Mating Interface

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| E01 | Connector sShell width | 12.73 | **Basic** |
| E02 | Upper row interface width (Datum N) | 11.28 | 0.03 |
| E03 | CL to CL of outside of contact beams | 10.50 | Basic |
| E04 | Vertical CL of connector shell (Datum N) to CL outside contact beams | 5.25 | Basic |
| E05 | Vertical CL of connector shell (Datum N) to CL of inside contact beams | 4.75 | Basic |
| E06 | Contact beam pitch | 0.50 | Basic |
| E07 | Connector shell height | 2.72 | **Basic** |
| E08 | Contact beam width (42x) | 0.16 | 0.03 |
| E09 | Latching mechanism height (2X) | **0.48** | **MAX** |
| E10 | Latching mechanism width (2X) | **1.10** | **MAX** |
| E11 | Outer radius of free connector shell (5X) | 0.30 | **Basic** |
| E12 | CL interface cavity (Datum P) to outer sharp corner of shell (TSC) | **0.17** | **Basic** |
| E13 | Polarizing notch height | 0.67 | 0.03 |
| E14 | Interface cavity height (A side to B side) (Datum P) | 1.23 | 0.05 |
| E15 | CL interface cavity (Datum N) to outer sharp corner of shell (TSC) | **5.19** | **Basic** |
| E16 | Polarizing notch width | 0.50 | **MAX** |
| E17 | REMOVED FROM DRAWING | | |



New Content

# 6. x4 Free Cable Assemblies

This chapter specifies x4 Free Cable Assembly attributes, signal pinouts and mechanical details, including drawings for the cable assembly form factors. The x4 Free internal cable assemblies have different constructions from the external box-to-box Free Cables and are shown separately.

## 6.1. x4 Free Cable Assembly Attributes

- Both passive and active cables must be invisible to system software (i.e., they are treated as software-transparent).
- Dual bundle, single bundle and ribbon cable solutions are acceptable, providing they meet all performance and form factor requirements (not all versions are shown).
- All x4 Free Cable Assemblies have the same pin numbering, as shown in Figure 6-1.
- See Table 3-1 and Table 3-2 for the Fixed internal connector pin assignments and Table 3-3 for the Fixed external connector pin assignments – *they are different*.

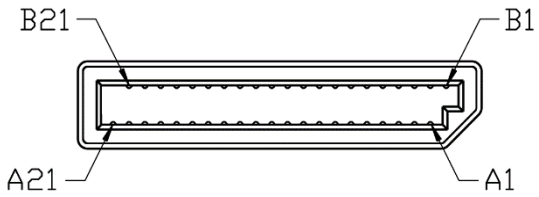



**Figure 6-1. Pin number locations for x4 Free Cable Assemblies**

### 6.1.1. x4 Passive Free Cable Solution Attributes

- Must not contain active components to (re-)drive the PCI Express signals across the cable.
- Is permitted to be limited to relatively short lengths; (i.e., 1 m – 2 m).
- Shielding may not be required for internal cables.

# 6. x4 Free Cable Assemblies

This chapter specifies x4 free cable assembly attributes, signal pinouts and mechanical details, including drawings for free cable assemblies. The x4 free internal cable assemblies have different constructions than the x4 free external cable assemblies and are shown separately.

## 6.1. x4 Free Cable Assembly Attributes

Cable assemblies may be part of electrically passive or electrically active solutions. These cable assemblies:

- Must be invisible to system software (i.e., they are treated as software-transparent).
- Must contain free cable-side connectors that adhere to the requirements defined in Chapter 5 of this Specification.
- Follow the wiring charts defined in Tables 6-9 and 6-10 for their intended application.
- May utilize any bulk cable type (e.g. dual bundle, single bundle, ribbon cable, etc.) and any cable exit. Finished cable assemblies must comply with the cable assembly form factor dimensions and performance requirements defined in this section, regardless of these variations, which are to be defined by the cable assembly supplier.

*[EDITORS NOTE: Figure 6-1 was moved to Chapter 5.]*

### 6.1.1. x4 Passive Free Cable Solution Attributes

All x4 free passive cable assemblies have the following attributes:

- Must not contain active components to (re-)drive the PCI Express signals across the cable.
- Are permitted to be limited to relatively short lengths; (i.e., 1 m – 2 m).
- May not require shielding for internal applications.

## 6.1.2. x4 Active Free Cable Assembly Attributes

- All external cable assemblies must provide 360° shielding from end to end.
- Is permitted to be implemented using copper or optical physical media.
- Is permitted to support maximum peripheral power of 10 W (equally distributed on the two 5 V power pins specified).
- Is permitted to support arbitrarily long cable lengths, as constrained by the active component power budget and PCI Express clocking schemes, in specific applications.
- Additional information regarding Active cables is contained in Appendix E.

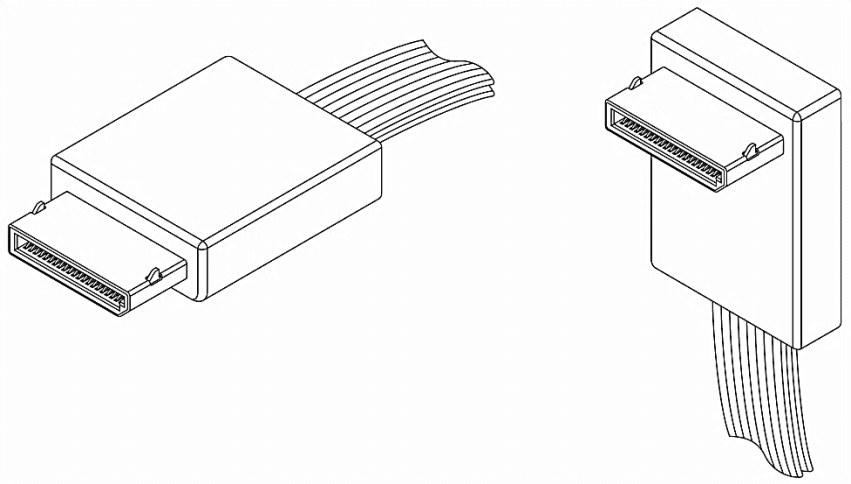


**Figure 6-2. Isometrics of x4 Free Internal Straight-out Exit and Right Angle Exit Cable Assemblies**

- See Chapter 5 for x4 Free Cable-side Connector mating interface dimensions.
- See Figure 6-9 and Figure 6-10 for contact and latch locations for any Free-side cable interface.
- See Sections 4.1 and 4.2 for the x4 Fixed Host Board-side Vertical Connector dimensions.
- See Wiring Charts in Chapter 6 for cable assembly wiring.
- Ribbon cable shown for internal cables; other bulk cable solutions are acceptable for both external and internal solutions.

# Request Request Request Request Request Request

## 6.1.2. x4 Free Active Cable Solution Attributes

All x4 free active cable assemblies have the following attributes:

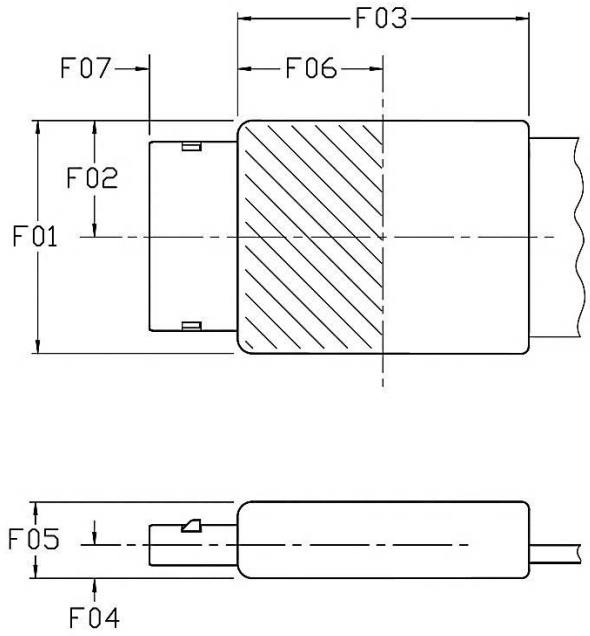
- Must provide 360° shielding from end to end.
- Are permitted to be implemented using copper or optical physical media.
- Are permitted to support maximum peripheral power of 10 W (equally distributed on the two 5 V power pins specified).
- Are permitted to support arbitrarily long cable lengths, as constrained by the active component power budget and PCI Express clocking schemes, in specific applications.

Additional information regarding active cables is contained in Appendix E.

*[EDITORS NOTE: Figure 6-2 moved to Section 6.2. The second section of bullet points was redistributed to various other chapters.]*

## 6.2. x4 Free Internal Cable Specification

### 6.2.1. x4 Free Internal Straight-out Cable Exit Assembly Form Factor




Note: Release Latch to keep within the cross-hatched area of F01 and F06.

**Figure 6-3. x4 Free Internal Straight-out Cable Exit Form Factor**

# 6.2 x4 Free Internal Cable Specification

Free internal cable form factors may utilize any cable exit. Straight-out and right-angle down variants are shown. Other variants must meet the cable form factor dimensions defined in this section and the mechanical performance requirements defined in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).

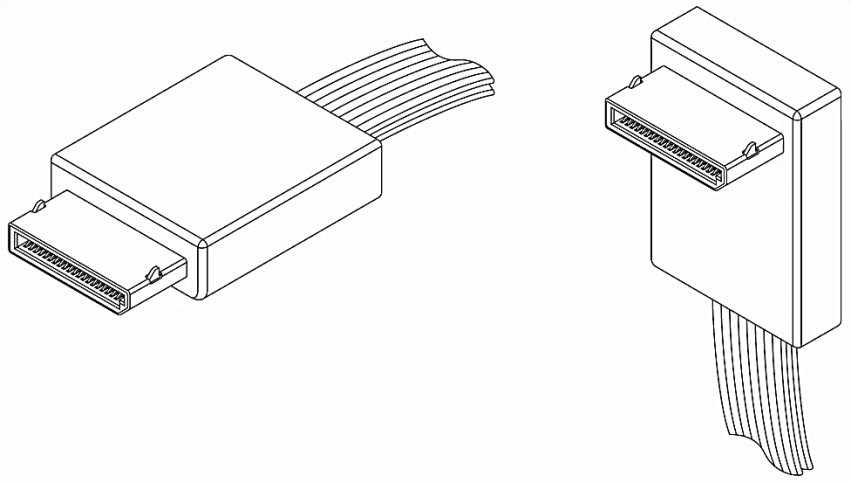


**Figure 6-2. x4 Free Straight-out and Right-angle Internal Cable Assemblies**

*[EDITORS NOTE: Figure 6-2 was moved from Section 6.1.2]*

## 6.2.1. x4 Free Straight-out Internal Cable Form Factor

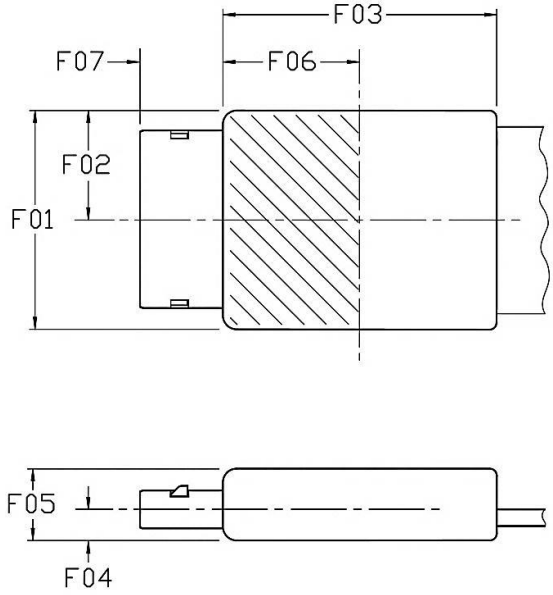



**Figure 6-3. x4 Free Straight-out Internal Cable Form Factor**

# Request Request Request Request Request Request

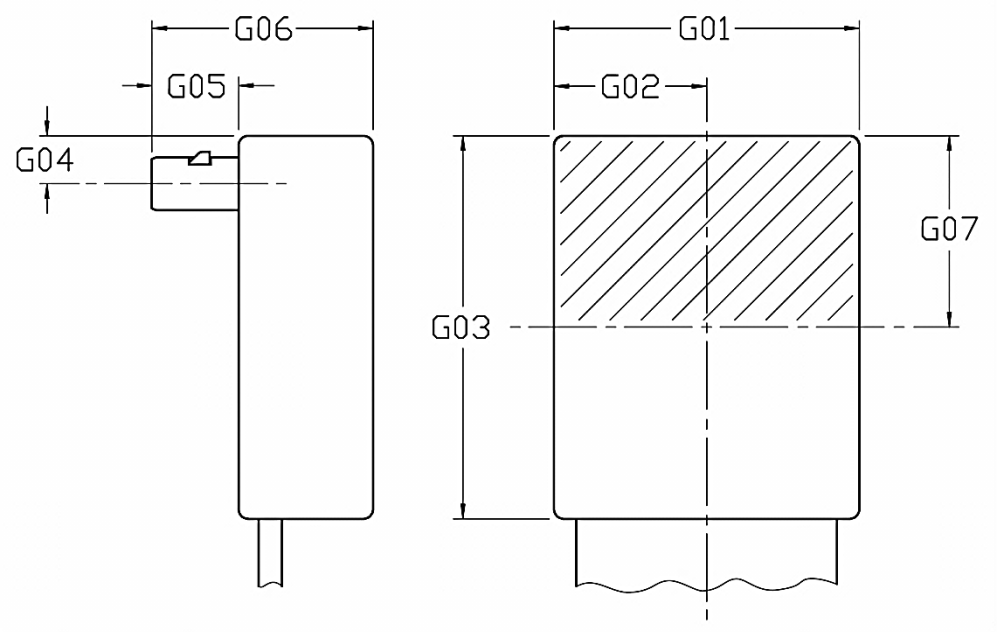
**Table 6-1. Dimensions for x4 Free Internal Straight-out Cable Exit Form Factor**

| Designator | Description | Dimension | Tolerance ± |
|---|---|---|---|
| F01 | Housing width | 17.00 | MAX |
| F02 | CL to housing edge | As required for F01 | |
| F03 | Housing length | 20.00 | MAX |
| F04 | Connector CL to bottom of housing | 2.20 (Note 1) | MAX |
| F05 | Housing thickness | 7.25 | MAX |
| F06 | Boundary for release latch | 10.1 | MAX |
| F07 | Connector snout length | 5.95 | 0.25 |

Notes:1. Required to enable the plug to be mated to a Mid-board-mounted x4 Fixed Right Angle Connector.

2. See Figure 6-9 and Table 6-7 for passive latch dimensions.

## 6.2.2. x4 Free Internal Right-angle Down Cable Exit Assembly Form Factor




Note: Release Latch to keep within the cross-hatched area of G01 and G07

**Figure 6-4. x4 Free Internal Right angle Down Cable Exit Form Factor**

# Request Request Request Request Request Request

**Table 6-1. Dimensions for x4 Free Straight-out Internal Cable Form Factor**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| F01 | Housing width | 17.00 | MAX |
| F02 | CL of plug shell to housing edge | **8.50** | **MAX** |
| F03 | Housing length | 20.00 | MAX |
| F04 | CL of plug shell to bottom of housing | 2.20 (Note 1) | MAX |
| F05 | Housing thickness | **7.50** | MAX |
| F06 | Boundary for latch release **(Note 2)** | **10.00** | MAX |
| F07 | Connector snout length | 5.95 | 0.25 |

NOTES:
1. Required for clearance when mated to a right-angle receptacle mounted mid-board~~Enables a straight-out cable assembly to be mated to a mid-board-mounted fixed host board-side right-angle connector~~.
2. Refer to Section 6.4 for passive and active latch dimensions.

## 6.2.2. x4 Free Right-angle Down Internal Cable Form Factor

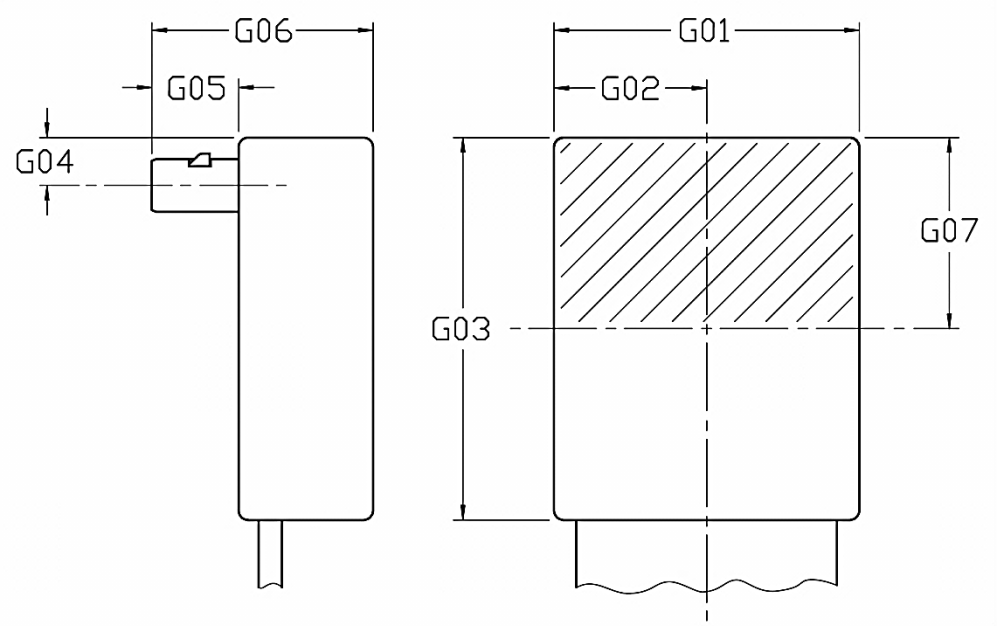



**Figure 6-4. x4 Free Right-angle Down Internal Cable Form Factor**



New Content

# Request Request Request Request Request Request

**Table 6-2. Dimensions for x4 Free Internal Passive Right-Angle Down Cable Assembly Form Factor**

| Designator | Description | Dimension | Tolerance ± |
|---|---|---|---|
| G01 | Housing width | 17.00 | MAX |
| G02 | CL to housing edge | As Required by G01 | |
| G03 | Housing length | 21.0 | MAX |
| G04 | Connector interface CL to edge of housing | 6.5 | MAX |
| G05 | Connector snout length | 5.0 | MAX |
| G06 | Overall height of plug | 9.8 (Note 1) | MAX |
| G07 | Boundary for release latch | 10.1 | MAX |

Notes:

1. Enables mated height to remain below the maximum component height on a PCIe add-in card when mated to a x4 vertical host-side connector.
2. See Figure 6-8 and Table 6-10 for active latch dimensions.

## 6.2.3. x4 Free Internal Cable Assembly Physical and Mechanical Performance

- Strain relief not required, but cable assembly must meet application requirements.
- Additional mechanical requirements are stated in Chapter 5.

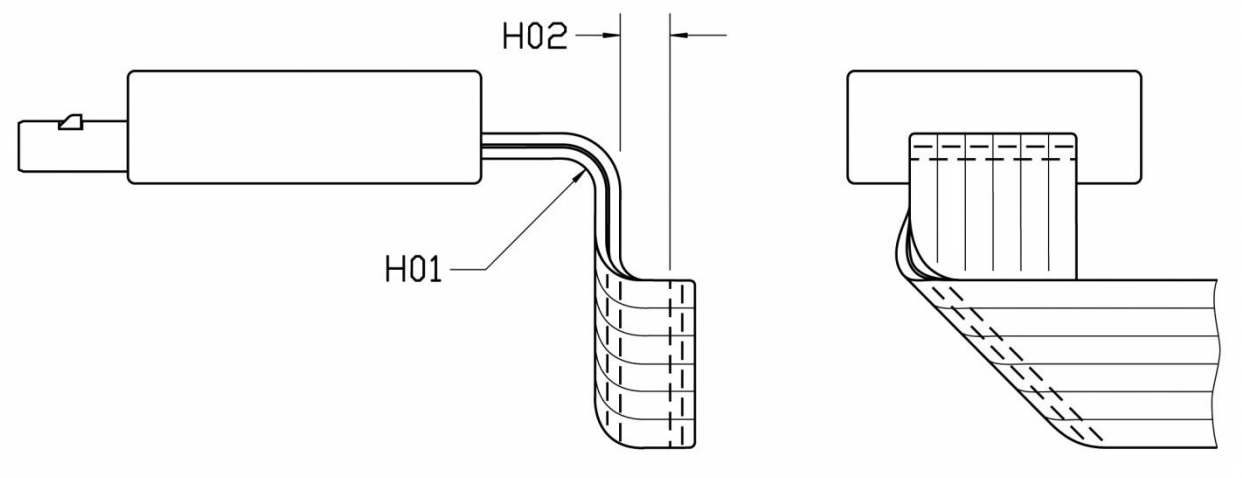



**Figure 6-5. x4 Free Internal Cable Bend Radius**

# Request Request Request Request Request Request

**Table 6-2. Dimensions for x4 Free Right-Angle Down Internal Cable Form Factor**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| G01 | Housing width | 17.00 | MAX |
| G02 | CL of plug shell to housing edge | **8.50** | **MAX** |
| G03 | Housing length | 21.0 | MAX |
| G04 | CL of plug shell to bottom of housing | 6.5 | MAX |
| G05 | Connector snout length | **4.62** | **0.38** |
| G06 | Overall height of right-angle plug assembly | 9.8 (Note 1) | MAX |
| G07 | Boundary for latch release **(Note 2)** | **10.50** | MAX |

NOTES:

1. Enables mated height of a right-angle down cable assembly to remain below the maximum component height on a PCIe add-in card when mated to a fixed vertical host board-side connector.
2. Refer to Section 6.4 for passive and active latch dimensions.

## 6.2.3. x4 Free Internal Cable Mechanical Performance

All bulk cable used for free internal cable assemblies has the following attributes:

- Must meet mechanical requirements are stated in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).
- Strain relief not required.

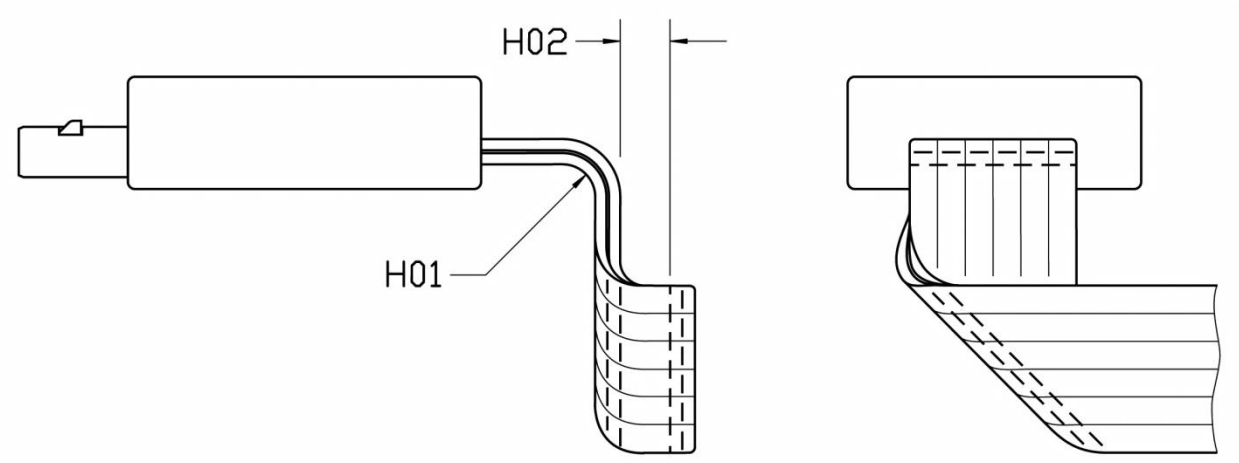



**Figure 6-5. x4 Free Internal Cable Bend Radius**

# Request Request Request Request Request Request

**Table 6-3. x4 Free Internal Cable Flex Requirements**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| H01 | Cable Bend Radius | Bend R MIN<br>supplier specific | Supplier specific |
| H02 | Note: Flat cable must not be folded flat against itself when folded. A minimum clearance between cables at the fold must be supplier specific minimum to preserve the properties of the insulator and thereby the signal integrity. | MIN clearance for cable thickness fold radius<br>supplier specific | |

## 6.3. x4 Free External Passive Latch Cable Assembly Physical Form Factor

The physical form factor for the x4 Free External cable assembly is bounded by the dimensions shown in Figure 6-6 and Table 6-2.

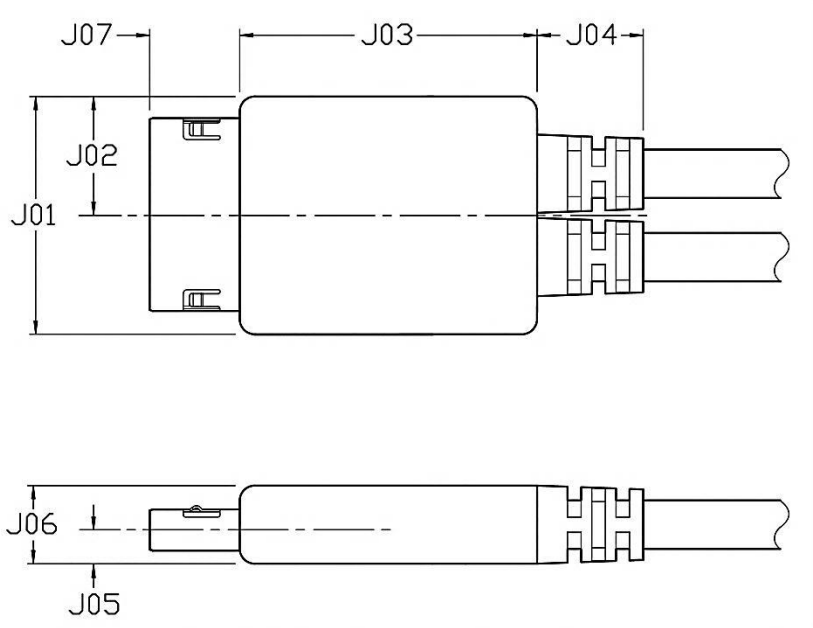



**Figure 6-6. x4 Free External Passive Latch Cable Assembly Form Factor Dimensions**

# Request Request Request Request Request Request

**Table 6-3. x4 Free Internal Cable Bend Radius Requirements**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| H01 | Cable bend radius | **MIN (Note 1)** | **Supplier specific** |
| H02 | Cable fold radius **(Note 2)** | **MIN (Note 1)** | **Supplier specific** |

NOTES:
1. To be specified by supplier.
2. Flat cable must not lay flat against itself when folded. Minimum fold radius is needed to preserve the properties of the insulator and therefore the signal integrity of the bulk cable.

## 6.3 x4 Free External Cable Specification

Free external cable form factors may utilize passive or active latches. All cable assemblies must meet the appropriate mechanical performance requirements defined in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).

### 6.3.1. x4 Free External Cable Form Factor with Passive Latch

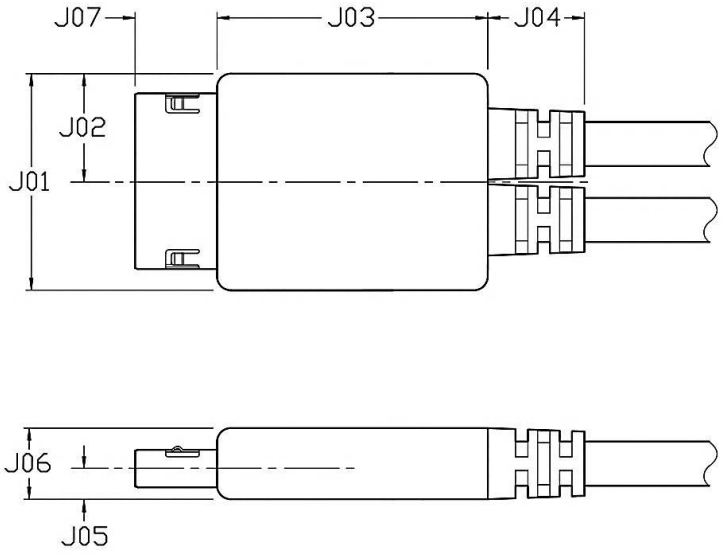



**Figure 6-6. x4 Free External Cable Form Factor with Passive Latch**

**Note:** Strain relief not required.

# Request Request Request Request Request Request

### Table 6-4. Dimensions for the x4 Free Passive Latch External Cable Assembly Form Factor

| Designator | Description | Dimension | Tolerance ± |
|---|---|---|---|
| J01 | Width of housing | 17.00 | MAX |
| J02 | CL of housing to edge | As required for J01 | |
| J03 | Housing length | 25.00 | MAX |
| J04 | Length of flex relief (optional) | 7.75 | MAX |
| J05 | Connector CL to bottom of housing | 2.60 (Note 1) | MAX |
| J06 | Thickness of housing | 7.25 | MAX |
| J07 | Connector snout length | 5.95 | 0.25 |

Notes:
1. Enables belly-to-belly implementations on a 1.4 mm MIN thick host board.
2. See Figure 6-9 and Table 6-7 for passive latch dimensions.

# Request Request Request Request Request Request

## Table 6-4. Dimensions for the x4 Free External Cable Form Factor with Passive Latch

| ID | Description (Note 1) | Dimension | Tolerance ± |
|---|---|---|---|
| J01 | Width of housing | 17.00 | MAX |
| J02 | CL of plug shell to housing edge | **8.50** | **MAX** |
| J03 | Housing length | 25.00 | MAX |
| J04 | Length of flex relief (optional) | 7.75 | MAX |
| J05 | CL of plug shell to bottom of housing (Note 2) | 2.60 | MAX |
| J06 | Thickness of housing | **7.50** | MAX |
| J07 | Connector snout length | 5.95 | 0.25 |

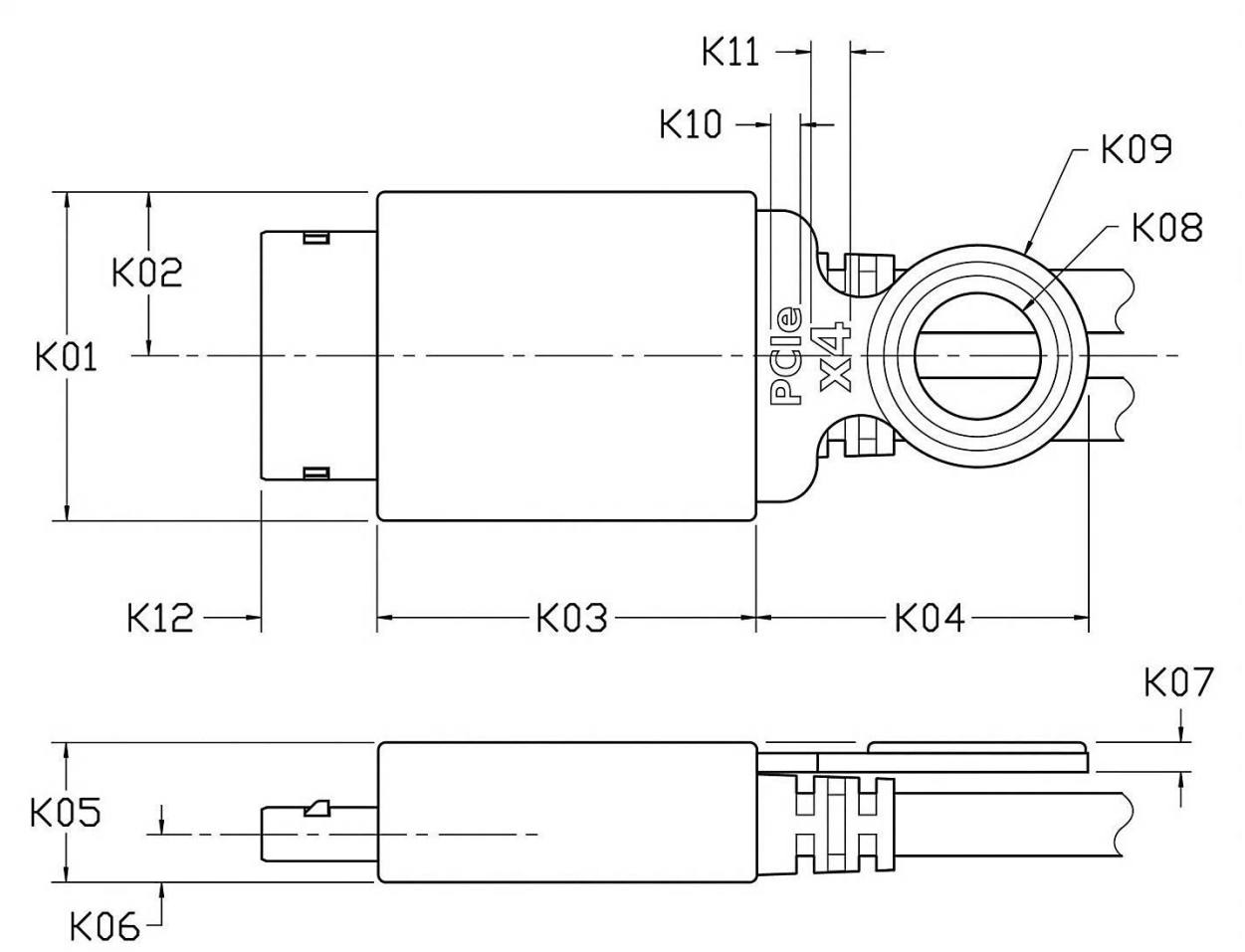
NOTES:

1. Refer to Section 6.4 for passive and active latch dimensions.
2. Enables belly-to-belly implementations.



New Content

## 6.4. x4 Free External Active Latch Cable Assembly Physical Form Factor




Note: PCI Express latch pull tab to be Pantone 354U Green

**Figure 6-7. x4 Free External Active Latch Cable Assembly Form Factor Dimensions**

## 6.3.2. x4 Free External Cable Form Factor with Active Latch

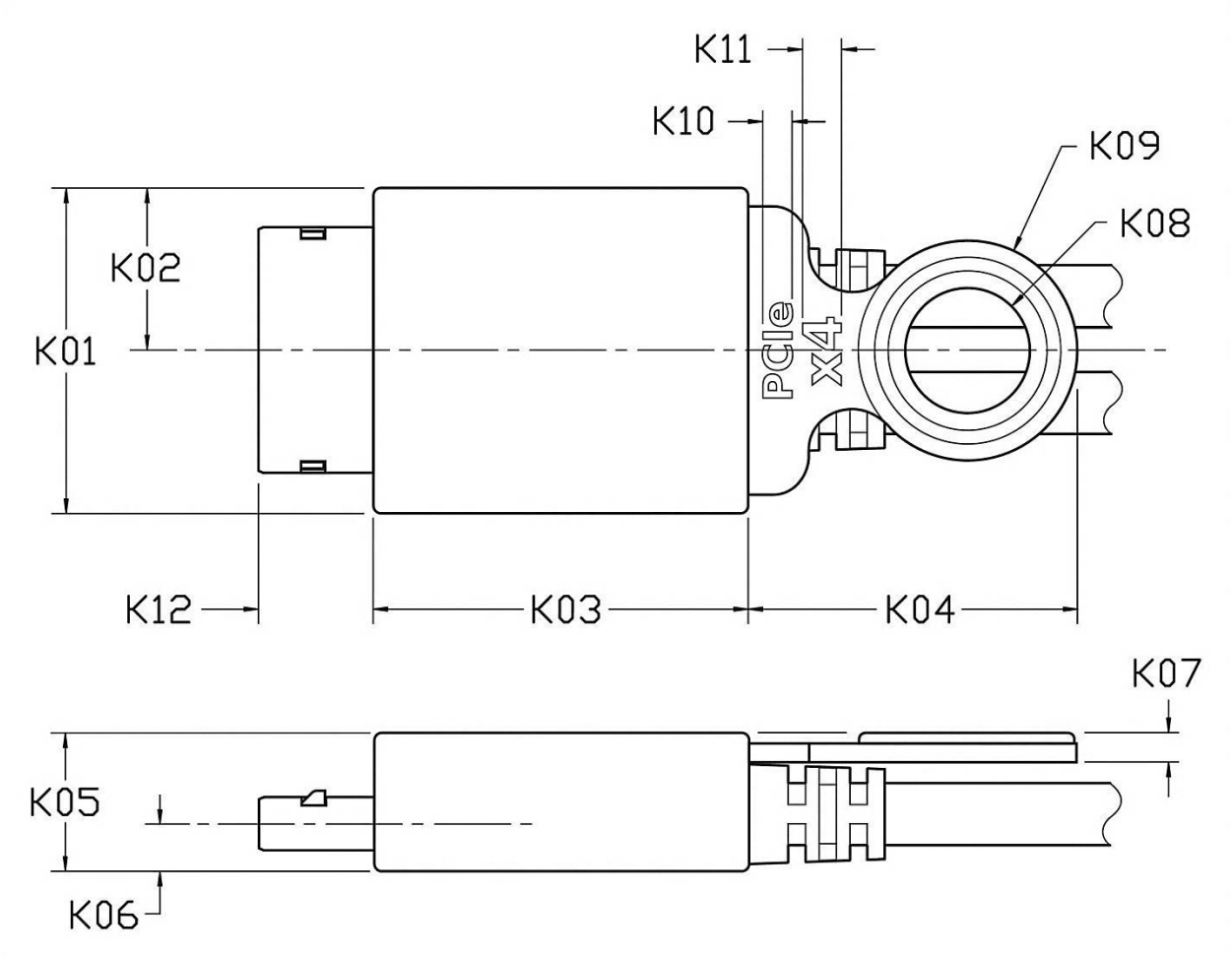



**Figure 6-7. x4 Free External Cable Form Factor with Active Latch**

**Note:** PCI Express latch pull tab to be Pantone 354U Green. Strain relief not required.

*[EDITORS NOTE: This section was previously Section 6.4.]*

# Request Request Request Request Request Request

### Table 6-5. Dimensions for the x4 Free External Active Latch Cable Assembly Form Factor

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| K01 | Width of housing | 17.00 | MAX |
| K02 | Connector CL to edge of housing | As required for K01 | |
| K03 | Length of housing | 25.00 | MAX |
| K04 | Pull tab length | 20.00 | MAX |
| K05 | Thickness of housing | 7.25 | MAX |
| K06 | CL of shell interface to bottom of housing | 2.60 (Note 1) | MAX |
| K07 | Pull tab thickness | 1.5 | MAX |
| K08 | Diameter of opening in pull tab | 6.4 | 0.5 |
| K09 | Outer radius of pull tab | 5.7 | 0.5 |
| K10 | Height of PCIe characters | 1.5 | 0.15 |
| K11 | Height of the x4 characters | 2.0 | 0.15 |
| K12 | Connector snout length | 5.95 | 0.25 |

Notes:
1. Enables belly-to-belly implementations on a 1.57 mm MIN thick host board.
2. See Figure 6-10 and Table 6-8 for active latch dimensions.

# Request Request Request Request Request Request

## Table 6-5. Dimensions for x4 Free External Cable Form Factor with Active Latch

| ID | Description (Note 1) | Dimension | Tolerance ± |
|---|---|---|---|
| K01 | Width of housing | 17.00 | MAX |
| K02 | CL of plug shell to housing edge | **8.50** | **MAX** |
| K03 | Housing length | 25.00 | MAX |
| K04 | Pull tab length | 20.00 | MAX |
| K05 | Thickness of housing | **7.50** | MAX |
| K06 | CL of plug shell to bottom of housing (Note 2) | 2.60 | MAX |
| K07 | Pull tab thickness | 1.5 | MAX |
| K08 | Diameter of opening in pull tab | 6.4 | 0.5 |
| K09 | Outer radius of pull tab | 5.7 | 0.5 |
| K10 | Height of PCIe characters | 1.5 | 0.15 |
| K11 | Height of the “x4” characters | 2.0 | 0.15 |
| K12 | Connector snout length | 5.95 | 0.25 |

NOTES:

1. Refer to Section 6.4 for passive and active latch dimensions.
2. Enables belly-to-belly implementations.



New Content

# 6.5. x4 Free External Cable Assembly Physical and Mechanical Performance

- Table 6-6 lists the external cable bend radius requirements for static bending.
- Additional mechanical requirements are stated in Section 6.9

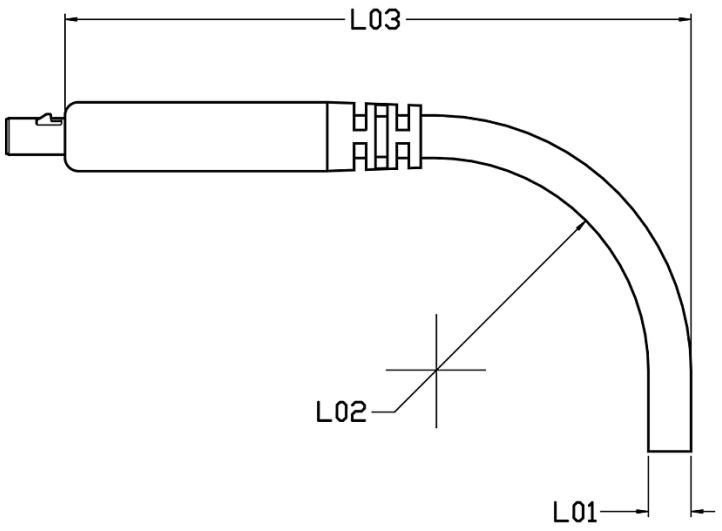



**Figure 6.-8. x4 Free External Cable Assembly Bend Radius**

**Table 6-6. x4 Free External Cable Assembly Bend Radius Requirements**

| Designator | Description | Dimension | Tolerance ± |
|---|---|---|---|
| L01 | 34 AWG 4-pair cable diameter | Supplier specific | Supplier specific |
| L02 | Inner bend radius | Supplier specific by gage | MIN |
| L03 | Face of connector housing to outside of cable bend | 42.80 | 3.0 |

# 6.6. Latching for All x4 Free Cable Assemblies

Figure 6-9 and Figure 6-10 show representative latch configurations. Specific shapes are left to the cable supplier, but must meet the insertion force and latch retention forces, defined in this Specification, when mated with and latched to the windows defined in the Fixed-side connectors, defined in this Specification.

See Figure 5-2 for the maximum allowable latch protrusion above the Fixed-side shell.

### 6.3.3 x4 Free External Cable Mechanical Performance

All bulk cable used for free external cable assemblies has the following attributes:

- Must meet external cable bend radius requirements for static bending listed in Table 6-6.
- Must comply with additional mechanical requirements listed in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).

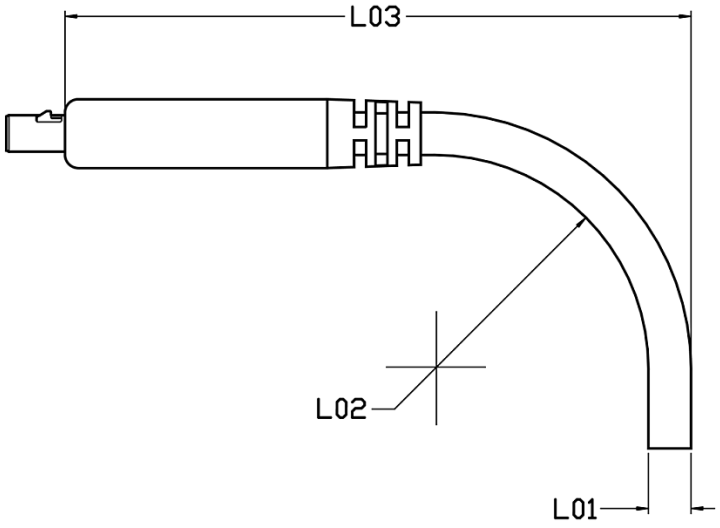



**Figure 6-8. x4 Free External Cable Bend Radius**

**Table 6-6. x4 Free External Cable Bend Radius Requirements**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| L01 | Cable diameter | Supplier specific (by gage) | Supplier specific |
| L02 | Inner bend radius | Supplier specific (by gage) | **Supplier specific** |
| L03 | Face of connector housing to outside of cable bend | 42.80 | 3.0 |

*[EDITORS NOTE: This section was previously Section 6.5.]*

## 6.4 Latching for x4 Free Cable Assemblies

Figure 6-9 and Figure 6-10 illustrate requirements for passive and active latch types, respectively. Specific latch design is left to the cable supplier, but all latches and mated cable assemblies must meet the performance requirements defined in Section ## (*EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section*).

See Figure 5-3 for the maximum latch protrusion allowable above the fixed host board-side shell.

### 6.6.1 Passive Latching for All x4 Free Cable Assemblies

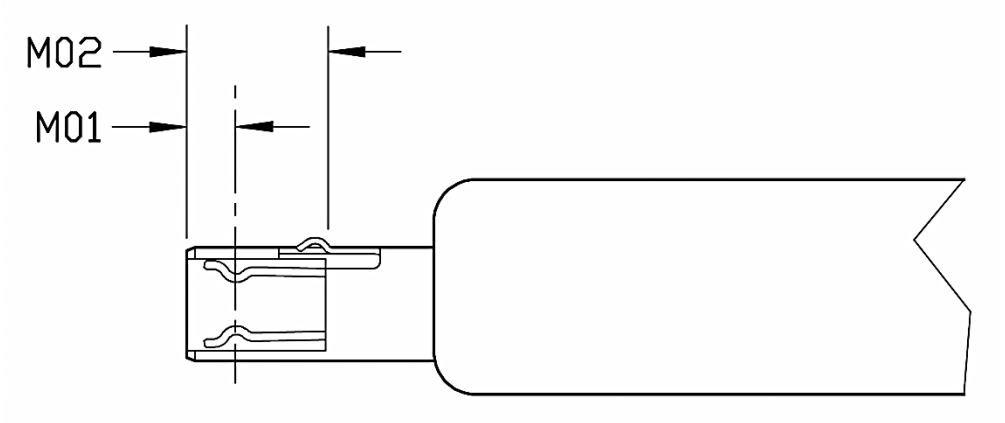



**Figure 6-9. Passive Latching Dimensions for x4 Free Cable Assemblies**

**Table 6-7. Dimensions for the x4 Free Cable Passive Latch**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| M01 | Front of connector to contact point | 1.19 | 0.11 |
| M02 | Front of connector to passive latch retention point | 3.49 | 0.20 |

### 6.4.1 Passive Latching for x4 Free Cable Form Factors

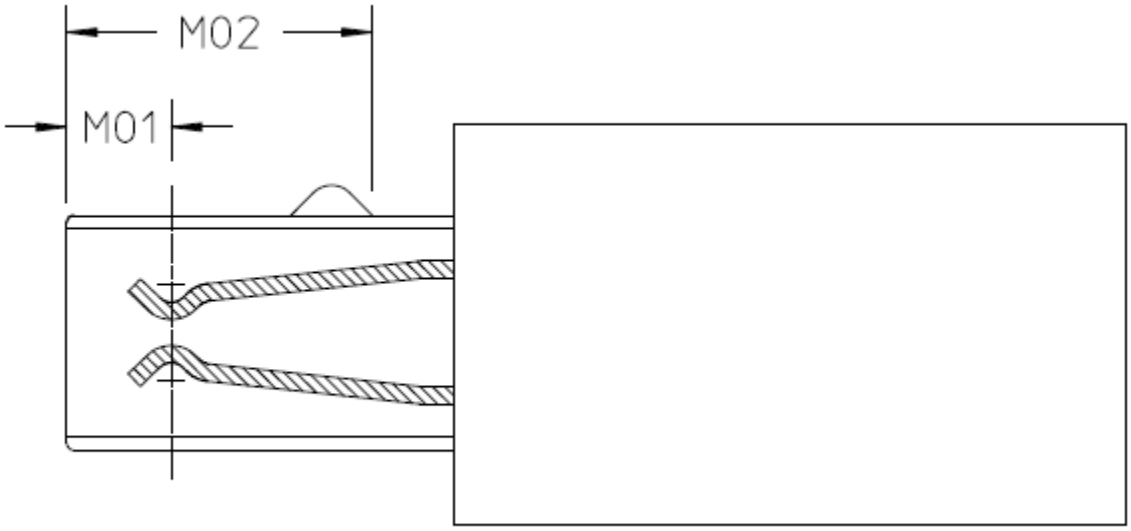



**Figure 6-9. x4 Free Plug Passive Latch**

**Table 6-7. Dimensions for x4 Free Plug Passive Latch**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| M01 | Front of connector to terminal contact point | **1.14** | **0.10** |
| M02 | Front of connector to passive latch retention point | 3.49 | 0.20 |

### 6.6.2 Active Latching for All x4 Free Cable Assemblies

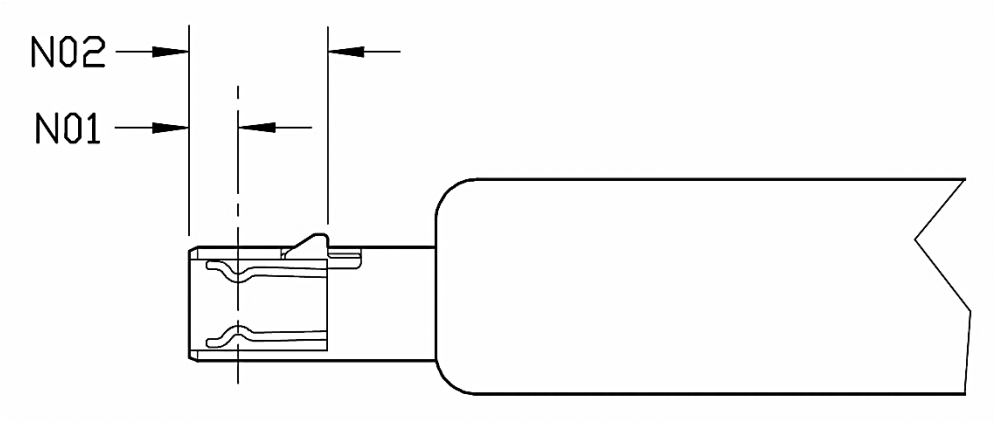



**Figure 6-10. Active Latching Dimensions for x4 Free Cable Assemblies**

**Table 6-8. Dimensions for the x4 Free Active Cable Active Latch**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| N01 | Front of connector to contact point of terminal | 1.19 | 0.11 |
| N02 | Front of connector to active latch retention point | 3.34 | 0.14 |

# Request Request Request Request Request Request Request

## 6.4.2 Active Latching for x4 Free Cable Form Factors

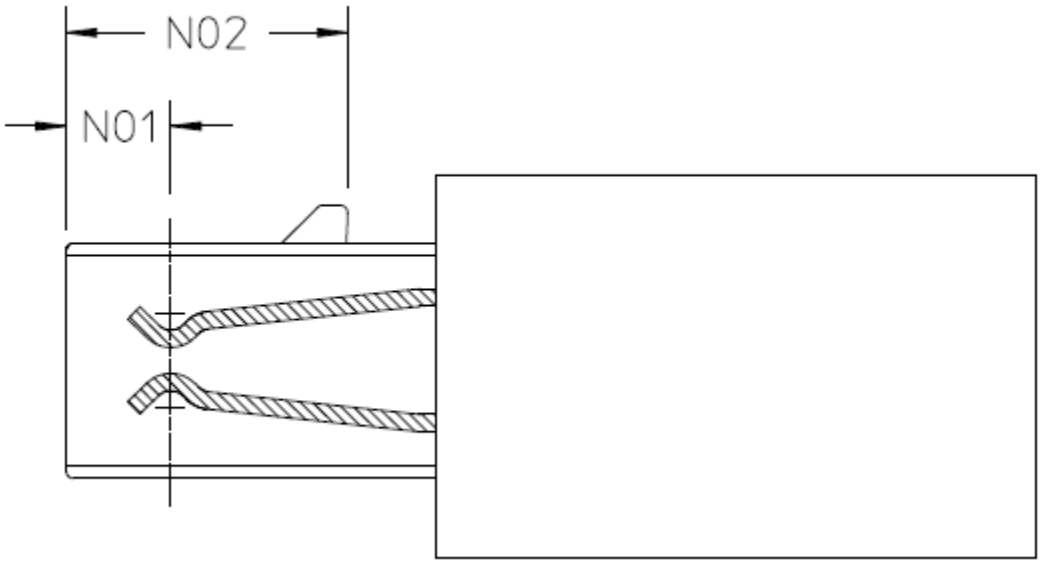



**Figure 6-10. x4 Free Plug Active Latch**

**Table 6-8. Dimensions for x4 Free Plug Active Latch**

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| N01 | Front of connector to terminal contact point ~~of terminal~~ | **1.14** | **0.10** |
| N02 | Front of connector to active latch retention point | 3.34 | 0.14 |

~~*[EDITORS NOTE: Appendix containing dimensions for hold-down features and keep-out zones for footprints to be added in a separate ECR.]*~~

# Request Request Request Request Request Request

*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

# Appendix G - Informative Footprints

The OCuLink Specification does not dictate how fixed host board-side connectors are attached to PCBs. The following informative footprints are provided as reference to complement the normative footprint features provided in Section 4. Other hold-downs are permitted as long as the form factor dimensions listed in Sections 4.1 and 4.2 are satisfied and the performance requirements listed in Section ## ~~*[EDITORS NOTE: Point to "Performance Requirements for Connectors and Cables" section.]*~~ 6.9 are met.

## G.1. Example Footprints for Fixed Host Board-side Vertical Connectors

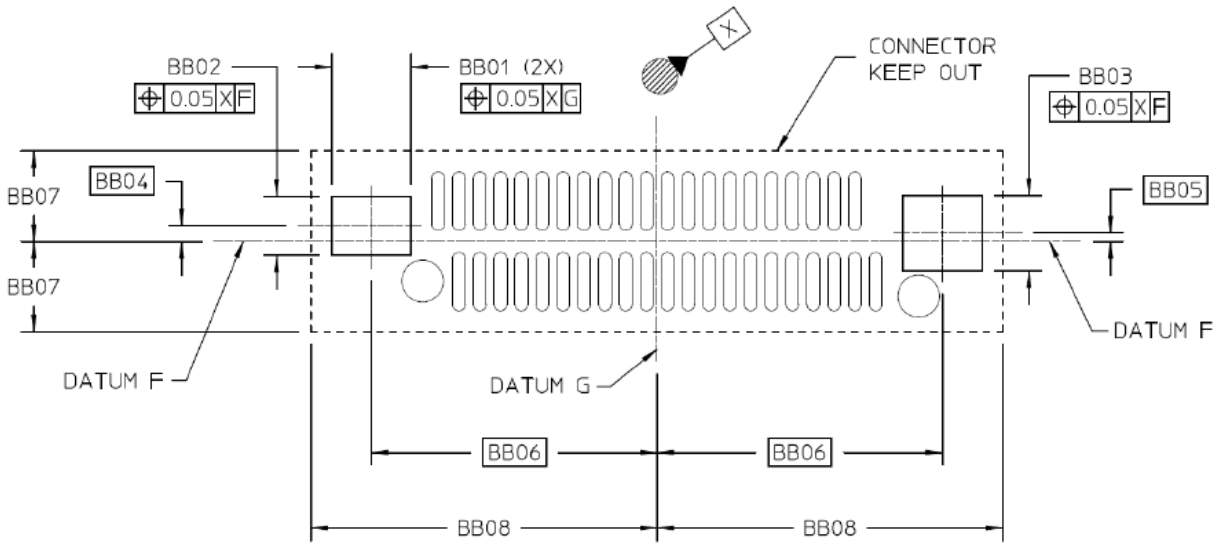



**Figure G-1. Example SMT Footprint for Vertical Connectors**

# Request Request Request Request Request Request

*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

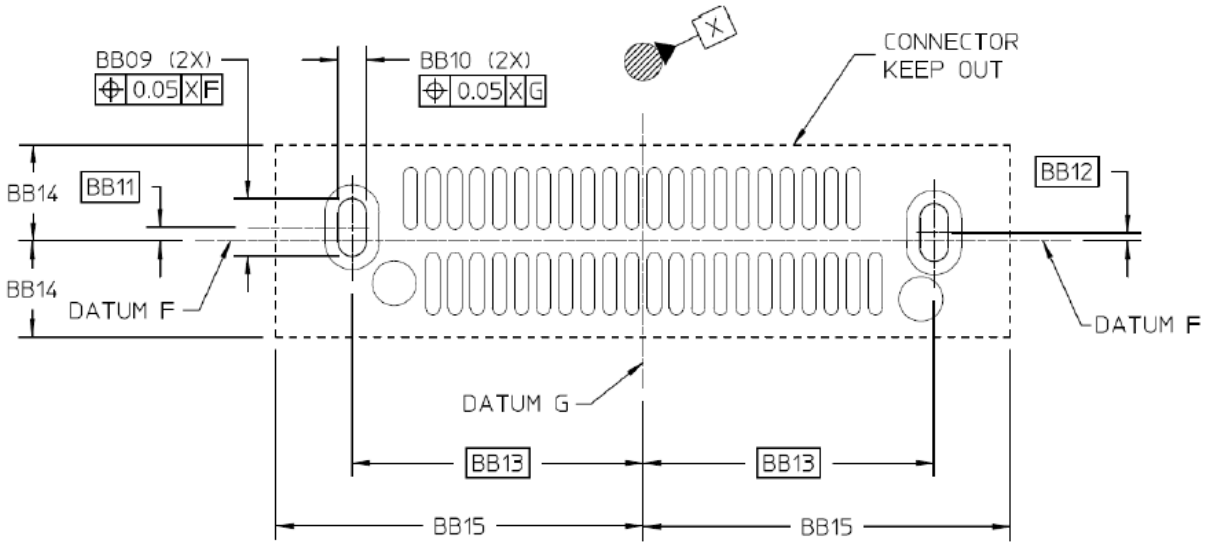



**Figure G-2. Example Through-Hole Footprint for Vertical Connectors**

# Request Request Request Request Request Request

*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

# Request Request Request Request Request Request

## Table G-1. Dimensions for Example Footprints for Fixed Host Board-side Vertical Connectors

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| **SMT Shell Hold-Downs** | | | |
| BB01 | Width of shell solder pad (2X) (EDITOR'S NOTE: formerly B09) | 1.90 | 0.10 |
| BB02 | Height of left shell solder pad (EDITOR'S NOTE: formerly B08) | 1.40 | 0.10 |
| BB03 | Height of right shell solder pad (EDITOR'S NOTE: formerly B18) | 1.80 | 0.15 |
| BB04 | Horizontal CL of solder pad array (Datum F) to CL of left shell solder pad (EDITOR'S NOTE: formerly B07) | 0.37 | Basic |
| BB05 | Horizontal CL of solder pad array (Datum F) to CL of right shell solder pad (EDITOR'S NOTE: formerly B16) | 0.20 | Basic |
| BB06 | Vertical CL of solder pad array (Datum G) to CL of shell solder pad (2X) (EDITOR'S NOTE: formerly B01) | 6.85 | Basic |
| BB07 | Horizontal CL of solder pad array (Datum F) to edge of keep-out zone height (EDITOR'S NOTE: Dimension has been split over Datum F; formerly total height of keep-out [B06 = 4.32 +/- 0.15]) | **2.16** | **0.07** |
| BB08 | Vertical CL of solder pad array (Datum G) to edge of keep-out zone width (EDITOR'S NOTE: Dimension has been split over Datum G; formerly total width of keep-out [B22 = 16.60 +/- 0.15]) | **8.30** | **0.07** |
| **Through-Hole Shell Hold-Downs** | | | |
| BB09 | Length of shell through-hole (2X) (EDITOR'S NOTE: formerly B26) | 1.30 | 0.10 |
| BB10 | Width of shell through-hole (2X) (EDITOR'S NOTE: Dimensions hole width; hole was formerly round (B26 = 1.30 +/- 0.10)) | 0.64 | 0.10 |
| BB11 | Horizontal CL of solder pad array (Datum F) to center of left shell through-hole (EDITOR'S NOTE: formerly B23) | 0.31 | Basic |
| BB12 | Horizontal CL of solder pad array (Datum F) to center of right shell through-hole (EDITOR'S NOTE: formerly B25) | 0.19 | Basic |
| BB13 | Vertical CL of solder pad array (Datum G) to center of shell through-hole (EDITOR'S NOTE: formerly B24) | 6.58 | Basic |
| BB14 | Horizontal CL of solder pad array (Datum F) to edge of keep-out zone height (EDITOR'S NOTE: Dimension has been split over Datum F; formerly total height of keep-out [ B06 = 4.32 +/- 0.15]) | **2.16** | **0.07** |
| BB15 | Vertical CL of solder pad array (Datum G) to edge of keep-out zone width (EDITOR'S NOTE: Dimension has been split over Datum G; formerly total width of keep-out [B22 = 16.60 +/- 0.15) | **8.30** | **0.07** |



New Content

# Request Request Request Request Request Request

*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

# G.2. Fixed Host Board-side Right-angle Connector Example Footprints

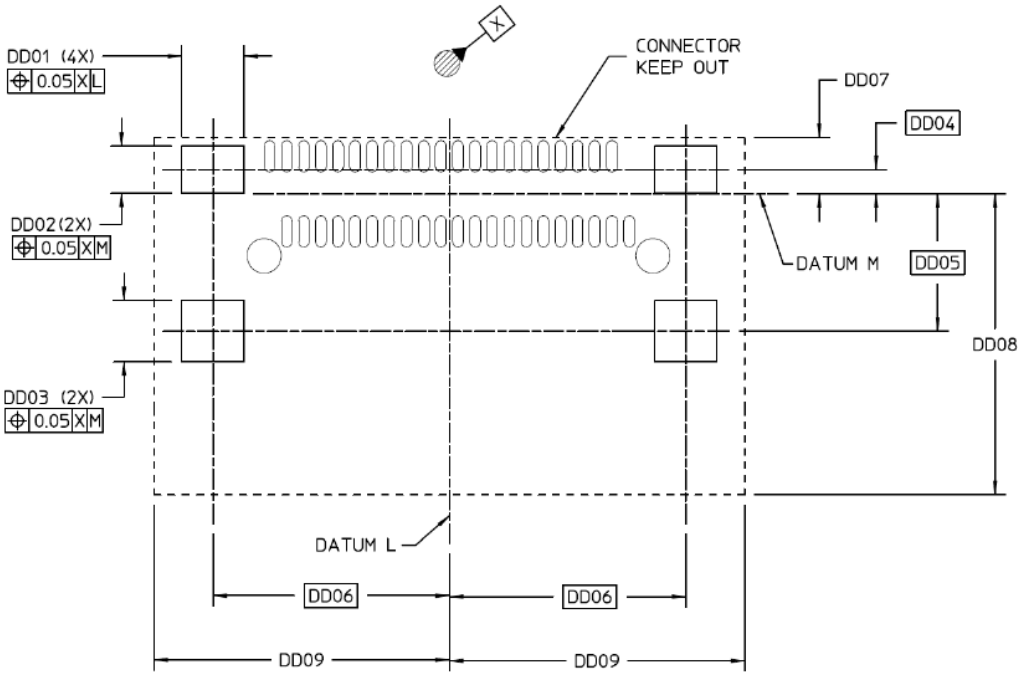



**Figure G-3. Example SMT Footprint for Right-angle Connectors**

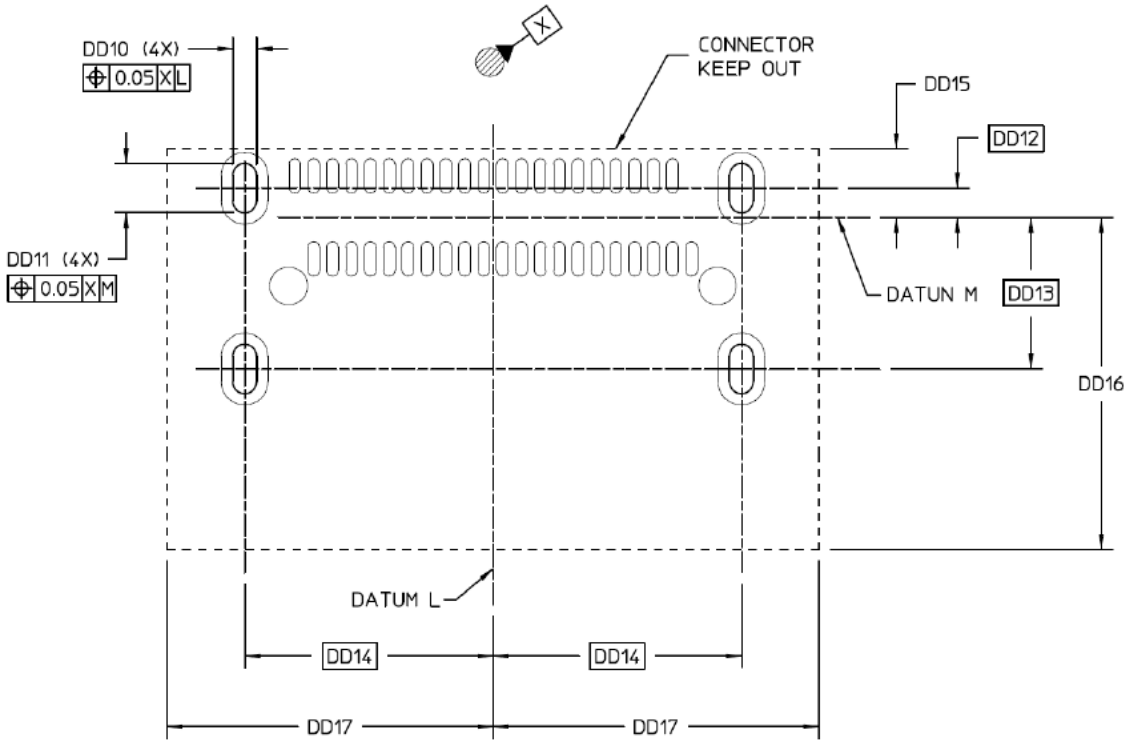



**Figure G-4. Example Through-Hole Footprint for Right-angle Connectors**

# Request Request Request Request Request Request

*EDITOR'S NOTE: New content begins here. No synonymous content in OCuLink 1.0 specification.*

# Request Request Request Request Request Request

## Table G-2. Dimensions for Example Footprints for Fixed Host Board-side Right-angle Connectors

| ID | Description | Dimension | Tolerance ± |
|---|---|---|---|
| **SMT Shell Hold-Downs** | | | |
| DD01 | Width of shell solder pad (4X) (EDITOR'S NOTE: formerly D05) | 1.81 | 0.10 |
| DD02 | Height of small shell solder pad (2X) (EDITOR'S NOTE: formerly D06) | 1.38 | 0.10 |
| DD03 | Height of large shell solder pad (2X) (EDITOR'S NOTE: formerly D16) | 1.80 | 0.10 |
| DD04 | Horizontal CL of solder pad array (Datum M) to CL of small shell solder pad (EDITOR'S NOTE: formerly D09) | 0.71 | **Basic** |
| DD05 | Horizontal CL of solder pad array (Datum M) to CL of large shell solder pad (EDITOR'S NOTE: formerly D11) | 4.01 | **Basic** |
| DD06 | Vertical CL of solder pad array (Datum L) to CL of shell solder pad (EDITOR'S NOTE: formerly D01) | 6.91 | 0.05 |
| DD07 | Horizontal CL of solder pad array (Datum M) to back of keep-out zone height (EDITOR'S NOTE: Dimension references Datum M; formerly dimensioned from locating peg [D08 = 3.45 +/-0.10]) | **1.64** | 0.10 |
| DD08 | Horizontal CL of solder pad array (Datum M) to front of keep-out zone height (EDITOR'S NOTE: Dimension references Datum M; formerly dimensioned from locating peg [DD07 + DD08 = D12 (10.42 +/- 0.15)] | **8.78** | 0.10 |
| DD09 | Vertical CL of solder pad array (Datum L) to edge of keep-out zone width (EDITOR'S NOTE: Dimension has been split over Datum L; formerly total width of keep-out [D22 = 17.25 +/- 0.15]) | **8.63** | **0.07** |
| **Through-Hole Shell Hold-Downs** (EDITOR'S NOTE: OCuLink 1.0 did not include a thru hole footprint for the right-angle receptacle; all dimensions match footprint for right-angle SMT receptacle except where noted) | | | |
| DD10 | Width of shell through-hole (4X) (EDITOR'S NOTE: Added dimension) | **0.64** | **0.10** |
| DD11 | Length of shell through-hole (4X) (EDITOR'S NOTE: Added dimension) | **1.30** | **0.10** |
| DD12 | Horizontal CL of solder pad array (Datum M) to center of back shell through-holes | 0.71 | Basic |
| DD13 | Horizontal CL of solder pad array (Datum M) to center of front shell through-holes | 4.01 | Basic |
| DD14 | Vertical CL of solder pad array (Datum L) to CL of shell through-hole | 6.91 | 0.05 |
| DD15 | Horizontal CL of solder pad array (Datum M) to back of keep-out zone height | 1.64 | 0.10 |
| DD16 | Horizontal CL of solder pad array (Datum M) to front of keep-out zone height | 8.78 | 0.10 |
| DD17 | Vertical CL of solder pad array (Datum L) to edge of keep-out zone width | 8.63 | 0.07 |



New Content